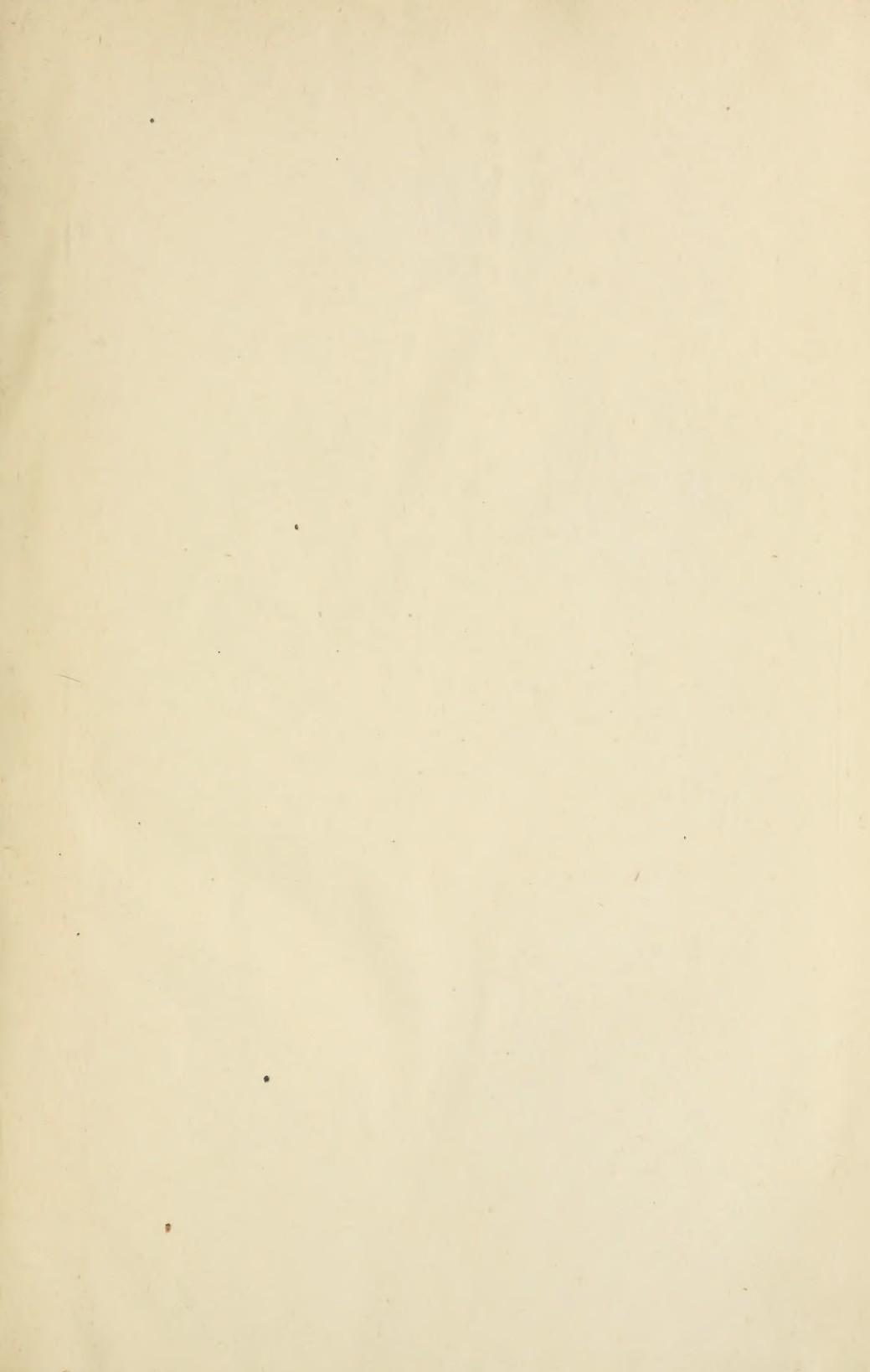
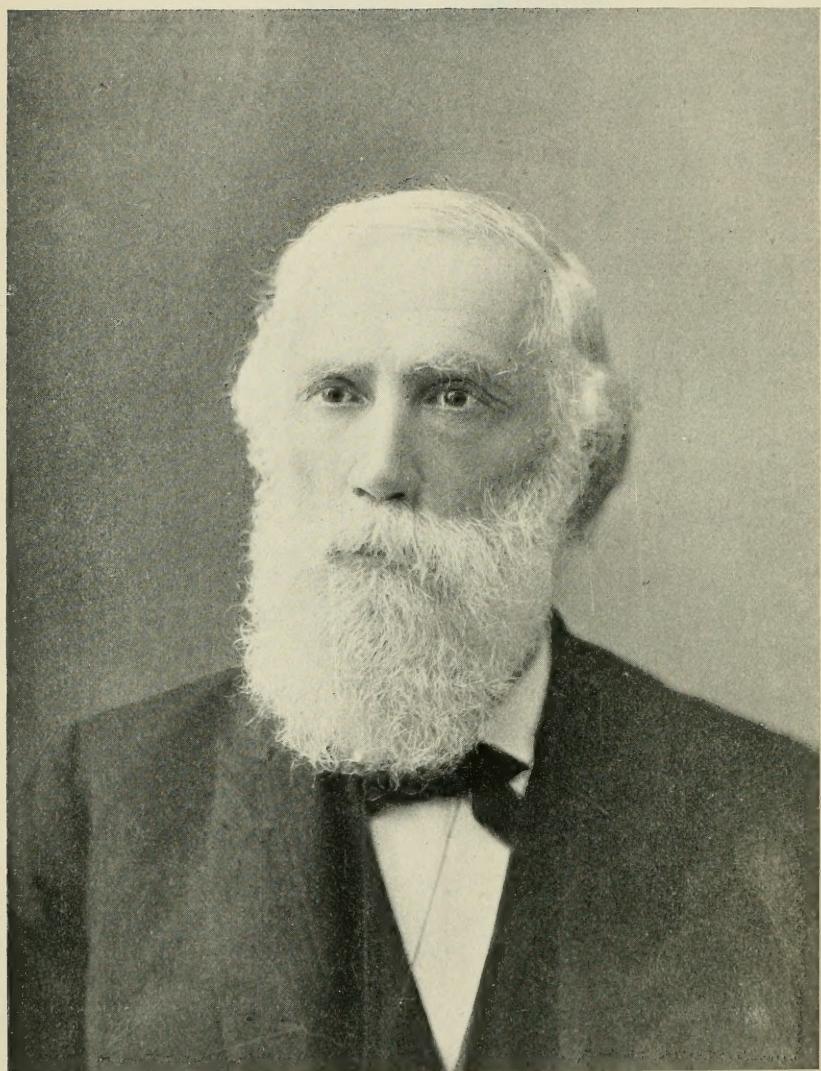


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HON. SAMUEL L. FULLER,
First President of Michigan State Horticultural Society.

TWENTY-SIXTH ANNUAL REPORT

OF THE

SECRETARY

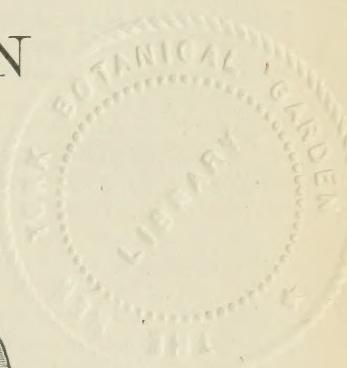
OF THE

STATE HORTICULTURAL SOCIETY

OF

MICHIGAN

1896



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HON. SAMUEL L. FULLER,

FIRST PRESIDENT OF MICHIGAN STATE HORTICULTURAL SOCIETY.

No part of Michigan has been more fortunate in the influence exerted for the good of the state by its progressive public men, than the Grand river valley. Prominent among the men whose influence has been widespread, blessing the state, is Samuel L. Fuller of the city of Grand Rapids. His early enlistment in the cause of agriculture and horticulture, and his persistent and unceasing efforts for their promotion and advancement have brought results that should endear him to every lover of the best interests of the state.

He signed the first call for a meeting to organize the State Horticultural society, and was made chairman of the meeting. He was unceasing in his efforts to build up the society and make it a power for good, his interest never flagging. He gave office room for meetings and consultation. He seemed to see more clearly than others the possibilities of horticulture in Michigan. He made a trip through Wisconsin, Minnesota, and the Dakotas, and on his return told the society to push on the work of horticulture; that the great northwest was waiting and hungry for Michigan fruit. His enthusiasm over the subject seemed to know no bounds. He prophesied that the northwestern states would want all the choice fruit Michigan could raise. He clearly saw the benefits which Michigan enjoyed by reason of its being a peninsular state, and was sanguine in his belief that horticulture in Michigan had a bright future. He was also an early worker in the Grand River Horticultural society and in the West Michigan Farmers' club. He seemed to be the life of both societies, attending all their meetings, acting officially most of the time as president or secretary. He often expressed a wish to be relieved of official duties, but the members of the society said "No, we can not get along without you; you are half of the meeting." He had a good and cheerful word for every farmer and horticulturist he met. He was a warm friend of farmers' institutes, and was one of the first to advocate an appropriation sufficient to hold at least one meeting each year in every county in the state.

Public spirited, yet he wanted no office for pecuniary gain. To benefit his fellow-man in the field of labor was to him sufficient reward.

Mr. Fuller came from that section of western New York made famous by the first thorough work in tile draining, by the veteran farmer John Johnston. He imbibed the vital importance of thoroughness and honesty in agricultural methods which characterized all his later utterances.

He was the pioneer in western Michigan in making and feeding ensilage. He was not afraid of things because they were new or strange, and often said he would be thankful if our judgment was right half the time. He believed earnestly and heartily in the great value that would accrue from organization, and remarked frequently that the fact that no two men believed exactly alike upon the same matter was a strong argument in favor of any method which would bring them

together to compare notes, see their own errors, and come to right conclusions and fortify their final efforts.

He often spoke of the value of the counsel he received from his wife, saying it was his custom to consult her upon all matters, even to the details, because he had so great confidence in her advice and judgment, and because he believed that was the true method of living.

He was particularly proud of the achievements of young men, and harbored no jealousy when a young man forged to the front in any line of activity. He often admitted a feeling of pride in having been able to give counsel which had enabled young men to avoid errors or take advantages of opportunities.

The unostentatious and silent yet salutary influence of such men makes the world grow better.

S. S. BAILEY.

SAMUEL LUCIUS FULLER.

Mr. Fuller is of Puritan descent, and was born in Geneseo, Livingston county, N. Y., in 1818. His mother came from Connecticut and his father, the Hon. P. C. Fuller, was a native of Berkshire county, Massachusetts.

Mr. Fuller received an academic education, graduating from the celebrated school of Dr. Beck in Albany. In the spring of 1836 he came to Michigan, spending the summer in traveling over the state, and in the autumn of that year settled in Grand Rapids as a surveyor and engineer. He found employment there and elsewhere, doing some of the time important state work. He helped lay out the city of Grand Rapids and the canal at the Sault Ste. Marie.

In 1840 Hon. Chas. H. Carroll engaged him to return to Livingston county, N. Y., as his private secretary. In 1844 he left Mr. Carroll to take charge of his father's estate in Conesus.

In 1853 he went to Europe to purchase thoroughbred cattle for an association of farmers of Livingston county. On his return he purchased the state premium farm near Geneva, N. Y., known as the "Delafield farm." Ill health compelled him to relinquish it and return to the "homestead" at Conesus, where he remained until his health was re-established. During that time he served in the legislature two years as member from that district. During his residence in Livingston county he was always active in whatever would promote the welfare of the community, ever holding the confidence and respect of his neighbors. He sat for years on the board of supervisors, was president of school board, and was civil magistrate, constantly acting as referee in legal disputes and administrator of estates. His patriotism was unimpeachable, physical inability alone preventing his entering the army when the civil war broke out.

In the spring of 1863, having become interested in the Central Express company, he went to New York to superintend its management.

In 1868, the company having sold its interests to the Merchants' Union, he came to Grand Rapids to engage in private banking, with his brother, Edward P. Fuller, which business they successfully carried on several years. His late years have been devoted exclusively to the management of their private business.

Since the above matter was written, the death of Mr. Fuller has occurred. He went to his rest April 27, 1897, interment ensuing in Oak Hill cemetery. The funeral was very largely attended and there were manifested many evidences of the high esteem in which he was held both by the public and by his more intimate friends.

REPORT OF THE SECRETARY

OF THE

MICHIGAN STATE HORTICULTURAL SOCIETY

ALLEGAN, MICHIGAN, }
December 31, 1896. }

To HON. HAZEN S. PINGREE, *Governor of the State of Michigan:*

I have the honor to submit herewith, in compliance with legal requirement, the accompanying report of 1896, with supplementary papers.

Respectfully yours,

EDWY C. REID,

Secretary of the Michigan State Horticultural Society.

OFFICERS

OF THE

STATE HORTICULTURAL SOCIETY FOR 1897.

PRESIDENT—ROLAND MORRILL, Benton Harbor.

HONORARY PRESIDENT—T. T. LYON, South Haven.

VICE-PRESIDENT—C. J. MONROE, South Haven.

SECRETARY—EDWY C. REID, Allegan.

TREASURER—ASA W. SLAYTON, Grand Rapids.

LIBRARIAN—ROBERT L. HEWITT, Lansing.

EXECUTIVE BOARD.

F. J. RUSSELL, Hart, 1 year.	L. R. TAFT, Agricultural College, 2 years.
R. D. GRAHAM, Grand Rapids, 1 year.	C. J. MONROE, South Haven, 3 years.
R. M. KELLOGG, Three Rivers, 2 years.	W. W. TRACY, Detroit, 3 years.

STANDING COMMITTEES.

ON FRUIT CATALOGUE—L. R. TAFT, Agricultural College, Chairman; T. T. LYON, South Haven; A. A. CROZIER, Agricultural College; W. A. SMITH, Benton Harbor; C. A. SESSIONS, Grand Rapids.

ON NEW FRUITS—T. T. LYON, South Haven, Chairman; C. A. SESSIONS, Grand Rapids; S. R. FULLER, Eaton Rapids; C. ENGEL, Paw Paw.

ON FINANCE—C. J. MONROE, C. W. GARFIELD.

ON ENTOMOLOGY—G. C. DAVIS, Chairman.

ON VEGETABLE PHYSIOLOGY—L. R. TAFT, Chairman.

ON LANDSCAPE GARDENING—E. FERRAND, Chairman.

ON VEGETABLE GARDEN—W. W. TRACY, Chairman.

ON FORESTRY—C. W. GARFIELD, Chairman, Grand Rapids; L. R. TAFT, Agricultural College; C. A. SESSIONS, Grand Rapids.

PROCEEDINGS OF THE WINTER MEETING.

HELD AT HART, FEB. 26 AND 27, 1896.

Remarkably pleasant weather helped greatly to make a pronounced success of the winter meeting of the society, held at Hart, Oceana county, the 26th and 27th of February. These dates, however, prevented the expected attendance of Prof. John Craig of Ontario experiment station and Mr. J. H. Hale of South Glastonbury, Conn., the famous peach-grower, who much desires to meet his fellow-horticulturists of Michigan. The dates also excluded the Agricultural college people, who were unable to absent themselves at the very beginning of the new school year. Nevertheless, there was abundance of good papers, and more than the usual number of questions, the discussion of the latter being a very prominent feature of the meeting.

The people of Hart provided everything requisite to the comfort and pleasure of the visitors. The court-house was the place of meeting, and it was at all times in fine order for the occasion. Music, both vocal and instrumental, was in abundant supply, while the townsmen no less than the farmers exerted themselves to make agreeable as well as profitable the time of their guests. The attendance was large, often filling the court-room to its utmost capacity.

At a session of the executive board, the resignation of Charles W. Garfield was presented and accepted, Mr. R. D. Graham of Grand Rapids being appointed to fill the vacancy. This was done with much reluctance, so far as acceptance of Mr. Garfield's resignation was concerned, but his reasons were so urgent, and his twenty years of official service had been so faithfully rendered, that concurrence with his wishes were unavoidable.

Reports of the standing committees were as follows:

RESOLUTIONS.

Resolved, That in coming to Hart, our hearts have been captured by the hearty welcome we have received from the open-hearted people of Hart and Oceana county, and that our hearty thanks are due, and are hereby given, to all the good people here who have in any way assisted in preparing for this meeting, in providing this room for our sessions, in enlivening our opening with soul-cheering music, in furnishing us homes during our stay, and in giving a full local attendance of interested people, such that each session has excelled its predecessors in interest and instruction; and so long as breezes blow and fruits ripen, our heart-beats will echo, "It was good for us to be there."

C. J. MONROE.

ASA W. SLAYTON.

CHARLES B. WELCH.

EXHIBITS.

Your committee would report that they have examined the exhibits and have found the following:

Upon the president's table, three varieties of apple, grown by Mr. M. Nelson of Menominee, Mich., consisting of Northwestern Greening, Wealthy, and Pewaukee. Specimens of the first-named variety weigh nine and one half ounces, and of the Wealthy, eight and one fourth ounces. All were in excellent condition and free from blemish. Such grand, beautiful fruit, from the upper peninsula, opens another field and adds another laurel to Michigan's fame as a fruit state.

There were also on exhibition, some fine, thrifty plants of primrose in variety, grown by Mr. E. D. Richmond of Hart. Another bouquet of fresh, fragrant flowers from Mr. Elmer D. Smith of Adrian, arrived at noon. They were yellow tulips, narcissus, carnations and ferns. We all love them—the sweet fragrant heralds from a stiller and more beautiful world. Beautiful flowers and our most beautiful thoughts go hand in hand, and one fosters the other.

Samples of field and sweet corn and grasses, shown by Mr. D. L. Garver, were both good and instructive.

Six samples of commercial fertilizer of the "Horse Shoe" brand were on exhibition. They were neatly put up in bottles.

The East Ross Basket Co. shows bushel and half-bushel crates, together with baskets. Both baskets and crates are well made and recommend themselves.

L. B. RICE.

C. J. CONRATH.

BENTON GEBHART.

PAPERS AND DISCUSSIONS.

THE STRAWBERRY IN MICHIGAN.

BY MR. C. M. WELCH OF DOUGLAS.

There are nearly as many advocates of different methods of growing strawberries as there are growers, but the method that will bring the greatest number of dollars and cents, other things being equal, is what we as practical growers want. Many of our growers have been quite successful with the strawberry, and each has, in a measure, methods of his own, some ways of doing things that have aided largely in making the business a success with him.

The methods pursued in our vicinity, western Allegan county, vary from setting the plants on half-prepared land, with as little care as possible, and growing them in connection with a crop of weeds and grass, to following the more improved methods of preparing the soil and cultivating in the best way known. The plan more commonly followed, and one that has brought good results, is to thoroughly prepare the soil the same as for other farm crops, set the plants in the spring and give good cultivation throughout the season, the plants being allowed to form in matted rows. Mulching is practiced but very little. The beds are picked as long as they will bear a paying crop, or until the grass or weeds become so troublesome as to make it unprofitable to longer clean them out.

For fertilizers, when used, stable manure is mostly depended upon, although many growers have been using in a small way different commercial fertilizers.

As the possibilities of the strawberry become better known, and we begin to realize that in the near future it is to occupy an important place among what we call our money crops, and we begin to comprehend our many advantages along the lake shore, over other sections of country, for its profitable cultivation, there is a marked improvement in the care, culture, and handling of it.

As I am better acquainted with my own doings than with my neighbors' I will give the methods I have pursued and that have made my strawberry patch the best paying part of my farm for the capital invested. As a rule we, in common with other growers, set our lower lands because of their holding moisture better in a dry time, which, being near the lake, we are safe in doing. Our soil is a rather low, sandy loam with a clay subsoil, well underdrained, one that has brought us some fine crops of berries when we have had some very dry seasons. For years we have grown them after the manner of farm crops, using in preparing the ground and cultivating the crop the same tools and

methods as pursued in other farm operations. However, the expense of putting out and caring for a crop of strawberries being greater per acre than for farm crops, we made them somewhat a special crop, and endeavored to do as much work in fitting the land and cultivating the crop as we thought could be profitably done. The past few years we have changed our course somewhat, and followed plans that have proved very satisfactory so far, and whereby we hope to increase our yield and lessen the expense of growing the crop—in fact, be able to grow better fruit at a less cost per quart. While we are using ashes, bone meal, and other commercial fertilizers, in a small way, we are depending mostly on clover, and have grown some of our best crops on clover sod alone. Whenever possible we commence preparation of our strawberry ground two years before we want to set it, by sowing it to clover, which is left to grow until nearly time to cut, when it is either cut and left on the ground, and the second growth allowed to come up through it, or the cows are turned on it a few days and allowed to eat and tramp it down as fast as they can, and the second growth allowed to come up; or it can be harrowed down—any way to get the first crop broken down while it is green, and the larger part left on the ground. In the fall the ground is given a thorough plowing. Don't hurry this job, because upon a thorough preparation of the soil will depend, largely, the success of the crop. The past two years we have plowed our land sixteen inches deep, turning over about seven inches of the surface soil and working the balance with a subsoil plow.

In the spring the ground was thoroughly worked with spading harrow and harrow. The rows were marked three feet ten inches apart, with a light, two-rowed hand-marker, making just mark enough to see. We set as early in the spring as the ground and weather will permit, usually the last of April or the fore part of May. The plants are set from two to two and a half feet apart in the row. An ordinary spade is used to make the holes, one man or boy dropping and two setting, making the holes and setting as they go along, the dropper straightening the roots of the plants ready to set and dropping only as fast as the plants are needed. Care is taken to set the plants as near the same depth they grew as possible, and to press the earth firmly around them. If the weather is very dry or the land in condition to work, we begin cultivation soon after setting. The past season having been a very dry one, we cultivated with a light harrow what was set each day, and continued shallow cultivation the entire season; and although it was quite late before the plants rooted, we got a much better stand than we expected.

Hoeing is done where needed and as often. The blossoms are picked off and the runners cut, the fore part of the season, which enables us to get the weeds pretty thoroughly subdued, and at very small cost, before letting the runners take root. If this work is done at the right time and in the right way it lessens the cost of growing the crop very much. We aim to get the rows about sixteen inches in width and the plants not too thick in the row, some varieties doing best in much narrower rows. We have some soils that would not grow a profitable crop except in wide rows. This way we get one heavy and rather late crop of berries and one lighter crop. Some varieties seldom grow more than one paying crop, and unless we can manage in some way to overcome the effects of

the draught after picking, we will be compelled to pick only one crop and plow under. Our rule is to pick two crops and then plow under, when the ground is soon sowed to clover, which in turn is plowed under, when it is again ready for strawberries.

If there is one thing of more importance than another, it is to set good, thrifty plants. We always take plants from a newly-set bed, discarding all poor and late-set ones. You may enrich your land, prepare it the best you can, and have an unprofitable patch by setting poor or mixed plants. Good, true-to-name plants are the cheapest.

We have a small trial plat where we try a few of the more favorably recommended of the newer kinds each year, and are able to decide for ourselves as to their merits or demerits before setting them in large numbers.

Near the lake, where we are likely to have foggy, damp weather during blossoming time, I would not set more than three rows of imperfect-flowering kinds together, and at least two rows of perfect-flowering kinds with them. The largest crop and finest fruit we ever grew was from a patch set two rows each of imperfect- and perfect-flowering varieties, all through the patch, and that in a year when the strawberry crop was generally quite light.

We have cultivated some of our beds early in the spring before picking, but find it of doubtful value and will try it very carefully hereafter.

In regard to varieties, my knowledge is somewhat limited, as our people have kept pretty closely to tried kinds. Some have been successful with one variety and think it has no equal, while others have had equal success with another kind. We have set varieties that seemed to be successful the first year but which never did anything afterward; while others, that did not do so well at first, afterward proved excellent. We have realized the most money from setting for our main crop only two or three well-selected varieties, and in giving a list of kinds I will not undertake to give a complete list of those grown about Douglas, but those that are best known at the present time.

Jessie has been largely planted because of its large size, fine color, and thrifty, hardy plant. With some it has been a money-maker and almost a sure bearer; with others it has been a somewhat shy bearer. It needs good soil.

Perhaps no berry we have will furnish as many quarts from the same number of plants as Haverland. The berries are of good size, easily picked, and the blossoms withstood the frost the past year better than other varieties. It should be kept in rather narrow rows, and mulched to keep the berries off the ground.

Bubach is a favorite with all who have grown it, and will be largely set this spring. Its season is rather short.

Many report Crescent as bringing them the most money, but larger kinds are taking its place. It is a sure bearer, and will stand neglect the best of any berry known.

Sharpless has proved a rather shy bearer, although a favorite with some on account of its large size.

The old Wilson has many friends and is largely set to fertilize imperfect-flowering kinds. It is considered the best berry we have for that

purpose, and would be largely set for market but for its rusting so badly some seasons.

Parker Earle is well spoken of and will be largely set this spring. It has done best in narrow rows and on good soil. The objection to it is that it over-bears. The berries run quite small on the latter pickings, and the plant seems to exhaust itself in bearing the first crop.

Gandy is claimed to be the best late berry. It is a light bearer and requires good soil. It blossoms late. The past spring it had not blossomed yet when we had our late frost, although all other varieties had.

From every grower that has tried it there is nothing but praise for Bedder Wood. It is early, large, of good color, and hardy, makes plants freely—a fine berry with which to fertilize Warfield.

Princess has been but little grown, but promises well.

Eureka, so far as grown, has proved of doubtful value.

Cumberland has become unreliable because of its rusting so badly.

Michel's Early is well spoken of as an early berry. It furnishes a few good pickings before other varieties ripen.

Swindle seems to be true to name.

Great claims are made for Timbrell, by those who have fruited it, as being a rather late, good-size, fine-flavored, and very productive berry.

Enhance, Brandywine, and Marshall have not been thoroughly tried with us yet, but promise to be valuable additions to our list of market varieties.

But, for all conditions of weather and all kinds of soil, no berry ever grown with us has become so generally a favorite as Warfield. It is one of the best shippers we have. However, it does best in rather thin matted rows and on good soil.

BY MR. E. L. BRILLHART OF LUDINGTON.

The first requirements that present themselves to my mind, for any kind of fruitgrowing, are these: A person able to stand disappointment, and live with a happy heart on the prospects of a future crop; one with natural desire for, and sole interest in, fruitgrowing, the grandest of all callings. He should be intelligent, energetic, and very particular; and with two more well-developed "bumps," one for neatness, the other for punctuality.

With these qualifications assured, it would be safe and advisable to look for a suitable location, which should be as close to market as possible. Low, wet, or valley land should be avoided for strawberries, on account of plants "heaving" in winter and always catching the slightest frosts in the spring. Select if possible a level piece of ground, elevated above all adjoining land, a place that is exempt from all common spring frosts, our greatest drawback here. The soil best adapted is a rich sand and clay loam, with clay subsoil.

I would first clean the ground of all stumps and stones, to the depth of ten inches, then cover the ground from sight with good, decomposed manure, prepared for the purpose. Plow as early in the spring as possible, and as deeply as the soil will permit. I apply ashes and all other kinds of fertilizer on the furrow, before dragging. For pulverizing the

soil I use the steel-frame spring-tooth harrow, setting it to run its lowest depth, and keep harrowing, till the frame fairly swims in the mellow soil. Then roll the ground down until firm and immediately go over it with a light smoothing-harrow, forming a fine dust mulch about one inch deep, so checking all further evaporation.

Marking is with me a particular point, not only to get the rows straight but uniform in width, so the different tools can be adjusted to run close to the row, without disturbing the plants, the marker I use being preferred to the old style. It consists of four runners, made of 2x6 scantling, nailed to two twelve-foot boards, with thills, to be drawn by a horse, which makes a very straight but shallow mark, making it much easier for setting plants than a deep, dried-out mark.

Be very careful where you get your plants. Many people delude themselves into the idea that it makes no difference, so long as they are strawberry plants, making little note of kind or sex or of the dilapidated condition of the old, run-out bed from where they are taken. Such plants are worse than stunted pigs; for those you can bring up to be thrifty, but the plants you never can.

In starting I would procure plants from some person that makes a specialty of growing pure-pedigree plants.

I take great care in this, to have all varieties marked, and by planting two or three acres every year I secure strong, healthy plants that have not been exhausted by fruiting.

As to varieties it is hard to decide, on account of new kinds constantly coming on the market, the difference in soil and ways of treatment making a marked difference with same variety. I find by observation a great many that are not posted in regard to staminate and pistillate varieties. The staminate or male plants can be set by themselves, producing perfect blossoms as well as fruit. The pistillate or female varieties produce imperfect blossoms that have no pollen, and must be set close to the perfect-flowering kinds. The wind and bees will complete the task of mixing. The leading varieties with me, for business, are Wilson, Crescent, Warfield, Bubach, and Parker Earle.

The old reliable Wilson has given good satisfaction with me, it being very hardy and productive. I use it mostly to fertilize other varieties. Crescent is the best early variety I have tried. The berries resemble Wilson very much, in shape and growth, but are of a little lighter color and more productive. Warfield, a grand berry, has but one fault, excessive plant growth, thus forming more fruit than ordinary soil can perfect. But for hills, and especially half matted rows, this variety is hard to beat. The berries are perfect in shape, and very solid, with a beautiful dark, glossy-red color, one of the very best for canning and shipping. Bubach, which makes a short, strong growth, is a good variety for large fruit, and is valuable for home market or fancy trade. I have grown specimens measuring 7 $\frac{1}{2}$ inches in circumference. Parker Earle stands ahead of all other varieties for me. Any berry that will stand the severe freezing of the night of May 19, and the worst drought we ever had in this section, and bear an enormous crop of fine, large berries, deserves more credit than I can put into words. It was the only one of eleven varieties that produced a full crop. It is especially adapted to hill culture, being

naturally inclined to stool, a very strong grower, and having thick heavy crowns and roots. The berries are of good size and quality and will hang on the vines for days, in the hot sun, without souring or scalding. I picked this season a pint of berries from a single plant that had been set only two months, without seemingly impairing the vitality of the plant. It made a strong rapid growth after fruiting. There are many other varieties that are worthy of trial, but these five can be relied upon for profit in this section.

To take up plants, use a potato-hook. Strike deeply, throw out the earth and plants together, shake out the plants, and immediately put them into bushel baskets, when enough are secured for one day's planting. Remove from all exposure to wind and sun, to the packing-house, where all runners, dead leaves, and weak plants are sorted out. Pack the plants, straight and tight, with roots down, in half-bushel climax baskets. Mark the name of variety on the basket. As fast as filled, set the basket in four inches of water, in a tub, leaving about five minutes, or till the roots are wet. Then set them in the shade till needed.

Setting the plants is particular work. I use a dibble made of half-inch hard wood, eight inches long and five inches wide, beveled to a sharp edge, and cover the lower point with tin to keep it sharp. I take the dibble in the right hand and brush the dry dust from the surface, then push the dibble into the soil, making a V-shape hole deep enough to admit the roots; and at the same time reach into the basket at the left, for the plant, invert the hand and plant, shaking it till the roots are all separated, then place it in the ground, arranging the roots fan-shape; then take the dibble and stamp around the plant, filling all depressions around the roots. Then press the ground down so firmly that a leaf could be pulled off without disturbing the plant. Be sure that the crown is on a level with the soil after setting.

The best time to set strawberry plants is in the spring. Fall planting should be done in August or September, so the plants can get well rooted before winter.

There are three ways of growing strawberries: (1) The matted row, which we see almost everywhere, is too thick to stand the dry weather we generally get and still produce good, marketable fruit. (2) The half matted row, about ten inches wide, where plants are not closer than six inches, will on good soil produce a fine lot of berries. (3) The hill system is the best way to grow nice berries. Set the plants three feet each way, or three and one half feet by eighteen inches, making it easy to cultivate and keep clean. So soon as the runners appear, cut them off with a sharp hoe or cutter, thus retaining the growth and vigor for new crowns to the hill.

The strawberry plant is a constant multiplier, so it is for us to decide whether we want the plants all over the ground, in rows, or consolidated into one mammoth hill, which will in all cases produce the finest fruit. If everybody would adopt the hill system there would be more satisfaction all around, and less grumbling about scrub stock and poor returns.

This simple act, cultivation, of which the theory is so poorly understood among many farmers, would better be investigated, so as to stop the old practice of deep cultivation to conserve moisture. I use nothing

but the hoe and Planet Jr. strawberry cultivator, which consists of twelve teeth and pulverizing attachment. With this cultivator, a Breed weeder, and R. M. Kellogg's plant-setter and automatic runner-cutter, the work of strawberry-growing would be much easier and more profitable. It is high time for the growers to wake up and procure all labor-saving tools, which will do the work easier and better, and we thus be able to raise larger yields of choice berries. The market is always ready and waiting to give good prices for fancy fruit of all kinds.

BY MR. W. W. RORK OF AGNEW.

For ten years we have been growing strawberries in a small way. From the first we desired to know for ourselves the very best and to produce the best. We began with Bidwell, Sharpless, Downing, May King, and Russell's Prolific. Since then we have grown Wilson, Manchester, Gandy, Michel, Dew, Bubach, Cumberland, Gillespie, Iowa Beauty, Regina, Beverly, Middlefield, Leader, Enhance, Marshall, and Timbrell. To cover the season I have largely planted Michel, Bidwell, Gandy, and Dew. I am still further trying Marshall and Timbrell. Marshall is tender in vine and will kill in the bud with frost. Timbrell did well last year, save that it scalded so that few berries came to the picking in good condition. The balance of those named I discarded. Bubach is not as productive as Bidwell, is too soft, and quality none too good. Gillespie is an excellent berry every way but not as productive as I would like. I may try them again. Enhance is productive, but too poor in quality and softens quickly when overripe. Beverly is fine in color, quality, and firmness, but under-size and not very productive. Dew is very large, fairly good, and firm, but tender in plant and bud, and bears fairly well only on good soil. It pays very well on account of its size and lateness of ripening. Gandy should be better in quality and yield. We are looking for a better late berry. Nothing has done better for an early berry than Michel, when not allowed to make too many plants, which it will do under any but the most vigorous treatment. I am looking for something better to take its place but have not found it yet. I will speak of only one more, Bidwell. With me this is the nearest an ideal berry of any I know. Perfect in vine, vigorous and hardy, has never failed to give fine berries through neglect, frost, and drought. It ripens early and continues as long as Gandy. The fruit is of good size all through the season, is productive, can provide new blossom stalks if Jack Frost gets the first, is the very best in color and firmness, while its quality is second to none. It has brought more money than any I have grown. I now have some new varieties on trial—Brandywine, Staples, and Annie Laurie. So far Brandywine and Staples are promising. Annie Laurie made a good growth but seemed shy in bearing. I have also two foreign sorts, Noble and Latest of All. The first did well, the other made a small and singular growth, but is almost as green as in summer.

We now come to the soil. It is low, dark, moist sand. We have not used fertilizers, but the ground was new and well supplied with ashes

from heavy burnings. All were planted on the same ground and had equal chance.

We take our plants for setting from new beds. We plant early in spring, putting the ground in readiness the previous summer by plowing well and cultivating till everything is twice dead. In the spring, cultivate and plant in rows four to four and a half feet apart and twenty inches to two feet in the row. We are not troubled much with weeds, but stir the ground as often as is needed. We pay but little attention to runners. Early in the fall we narrow the rows to about eighteen inches and cultivate the next summer as is best. We prefer the matted row for these reasons: We do not mulch, and the wind blows the sand away from the hills and covers the crowns; it is also less work, and gives as large a yield if not allowed to mat thickly; the fruit is also cleaner; we have never failed of a fine crop. So far our land has been new and will be for a time. If it were old we should depend upon clover and ashes largely for fertilizing. Our farm lies one and one half miles from the lake. With us the low ground is not more subject to damage by frost than is the high. Growth starts later, and blossoms and fruit are later. We have sold most of our berries in the home market and in inland towns. There is a good demand for first-class fruit honestly packed.

We join hands with all who love the ideal life and home amid trees, vines, fruit and fragrant flowers, and who are bound to put the business to the front, not forgetting the public good and the happiness and prosperity of the coming generations.

BY MR. J. B. HOUK OF LUDINGTON.

Almost any kind of soil, if well fertilized and free from foul seed, that has good water and air drainage, will grow strawberries. For the early varieties, a south slope is preferable, but for the late ones a north slope or level land is best, if not subject to late frosts.

In preparing the soil it should be put in the best possible condition by plowing in the autumn and again in the spring, and by frequent harrowing. Then roll or use a float. Do not leave on the ground any rubbish, such as stone, roots, corn stubble, or anything that will hinder cultivation. When ready to plant, it should look like a garden. In growing strawberries, like other crops, when the soil is well prepared it takes less labor to keep it clear of foul grasses. Mark both ways, as far apart as it is wished to set the plants. We set three feet each way, and think that is about right where you wish a narrow matted row.

In setting plants we use a short-handled spade to make the holes, then place the plant in the hole, being careful not to get the crown of the plant below the surface, and have the roots straight in the hole, and not have any of them above ground. Then step firmly on one side to press the soil around the roots.

Cultivation should be started as soon as possible after setting, so as to hold moisture and destroy the weeds. Cultivate both ways until mid-season, then place the runners the way it is wished to have the matted row. Do not let the row become over six or seven inches wide. Keep the plants well hoed; pick off all the blossoms; do not let plants bear fruit the first year after setting.

In selecting plants, be sure to get the varieties that do the best in your locality and on the kind of soil you have. The variety that will do well on sand may be a failure on clay and vice versa. In taking up plants, care should be taken not to cut or injure the roots any more than necessary. The varieties that have given the best satisfaction in this locality, are Wilson, Crescent, Warfield, Greenfield, Haverland, Gandy, and Manchester. Wilson is one of the old varieties and one of the best yielders, and does best on sandy soil. Crescent is another old standby that does well on sandy land, is rather small, but very productive. Warfield is one of the best if grown on moist soil, but is a short-rooting variety and will suffer from drought on sandy soil. Greenville is one of the new varieties, but with us, the past season, it gave good satisfaction. It is one of the large, late ones, and holds its own all through the season, the last picking being as large as the first of the Wilsons. Haverland is one of the best berries we have. It stood the frost and snow storm last May the best of any berry we had, and ripened all its fruit in good size. The berries are very handsome, of large size and good quality. Gandy is a well-known variety, is one of the largest and latest, but a shy bearer; it is a good market berry, always brings a good price. Manchester is one of the large late berries that do well on some kinds of soil. I notice in several localities it is in the discarded list, but around Ludington it is grown extensively on muck land and gives the best satisfaction when other varieties fail. There are scores of other varieties that have been tried in this place, and so far we have found none others that will come up to the requirements of a good market berry although we have quite a number that have not fruited yet, and expect great things from some of them. In setting new varieties, set just enough to give them a good trial, as there is more lost than gained in setting largely of untried sorts.

BY MR. C. E. WHITTEN OF BRIDGMAN.

I think it is an admitted fact that Berrien county grows more strawberries for market than any other county in the state. Our township (Lake) will rank second in the county, with a total of 8,649 bushels marketed in the season of 1894, with a grand total of 62,493 bushels for the county the same season. These figures are from the report of the Secretary of State. I had thought to be able to give the exact number of acres growing in our township last season, but could not get these figures. I will say, though, that nearly every farm has from one to ten acres in bearing.

Twenty-five years ago, when this industry was in its infancy, it was thought that the lighter, sandy soil was best adapted to strawberry culture—in fact, was the only fit soil for it. Time has wrought many changes in this, as in all other lines, and today we pick our best land for this crop. My ideal would be a rich, sandy loam, rather low if it could be properly underdrained. Of course, care should be taken to avoid locations much subject to spring frosts, as these are the bane of the strawberry-grower, oftentimes the most brilliant prospect changing to a dismal failure in a single night.

In fitting the land for this crop, I think those meeting with best success practice fall plowing, this being done as late in the season as practi-

cable. I do not think any one has plowed as deeply as our friend Kellogg of Ionia advises, nor do I think it necessary on our sandy soil. However, we want land well plowed.

In the spring, as soon as the land is in suitable condition to work, we harrow thoroughly with a spring-tooth harrow, following with a smoothing-harrow and plank drag or roller.

The method of culture most common in this locality is that known as the matted row system. Right here I may say that many make the mistake of letting the rows mat too thoroughly. To assure best results, especially with those varieties which are free plant-makers, as Warfield, Greenville, and others, only a small proportion of plants setting should be allowed to root, and these from the earlier growth. Then all later runners should be clipped, thus throwing the growth into a smaller number, insuring a vigorous plant for fruiting the next season, which would probably produce fine fruit; while, if all the runners were allowed to root, the plants would be so thick on the ground that at best they would be weak and puny, and if they survived the winter, would give an unsatisfactory crop of small and "buttony" berries.

The usual mode of setting is to have rows marked out with a light marker, although some use a line, having rows from $3\frac{1}{2}$ to $4\frac{1}{2}$ feet apart according to variety. One man leads with a spade, and with a thrust and slight side motion makes an opening to receive the plant. If only rowing one way, an intelligent workman will soon learn to space about the right distance between plants, without measuring, and will progress quite rapidly.

The plants should have been prepared previously. They should be nicely trimmed and roots straightened, and roots should be kept moist while in the field.

The most particular part is in getting the plant set at just the right depth. This requires an experienced hand to assure success. He follows with the plants in pail or basket, and, grasping each plant by the crown, giving a quick jerk or flirt to straighten the roots, places it in the opening made by the spade, being very particular to have the crown just at the surface; then, with a good strong pressure of the foot, the opening is closed, holding the plant firmly in the soil.

The amount of care taken in setting will determine to a great extent the future success or failure of the enterprise. If set too deeply the heart will decay and plant die, while if not deep enough the plant will be liable to drying out, with same effect. It is also important to have the roots spread out as much as possible and not bunched in small space.

As soon after setting as practicable, the surface should be stirred to preserve moisture in the soil. For this purpose we use what is known as an Ajax harrow. This is a steel-frame, horse-cultivator with spike teeth. With this implement one can run very close to the row without covering or loosening the plants. There is still a narrow space untouched, and hand hoes are called into play to loosen this; but avoid deep working if possible. We should never allow the surface to crust over, and the cultivator should be kept going as often as once per week at least, and oftener if the season is very dry.

One thing I failed to mention in the setting was fertilization, or more properly speaking, pollination. It is generally conceded that imperfect pollination is the cause of so many "buttony" and "nubby" berries toward the close of the season, and some are alternating two rows of pistillates with two rows of staminates. Ordinarily I consider every fourth row a staminate enough.

As to varieties being grown in this locality, I will speak of pistillates first. I presume Warfield would lead in acreage, although Crescent would probably give it close second. Warfield is much the better berry of the two. While Crescent seems to adapt itself to almost any soil or condition, Warfield is a little more particular and does not do its best on a light, dry soil, but seems to need a good, strong soil. Haverland and Bubach are both very productive of large and showy fruit. Bubach, I think, will average a little the larger, while Haverland is probably the more productive. Barton's Eclipse is similar to Haverland and is probably a little firmer and higher colored. I predict that this will become a standard market sort when its good qualities shall become better known. Greenville has had a big boom since its introduction, three years ago, but I am not prepared to say much for or against it yet, as I have not been able to thoroughly test it. Last season I should have fruited it, but frost made nearly a clean sweep of this as well as several other sorts that I was testing for first time. Greenville seems to be very vigorous and healthy, and promises well, although I hardly think it will come up to the introducer's claim for size, which was "an improvement on Bubach."

Among the newer kinds, Bisel is very promising. It is a strong and healthy grower, and if properly pollinated is very prolific. I would recommend this as a good market variety. Timbrell, after all the boom it had in its introduction, proves to be very nearly a fizzle. I think among staminates Lovett is being used as a pollener more than any other variety. Next to this comes Wilson, Beder Wood, and Michel, while some still hold to Jessie and Sharpless; but these last named are too likely to be "nipped in the bud" to be very profitable. Parker Earle has been very popular with some, while others call it a failure. The secret of the difference of opinion seems to be in the different treatment given. This variety needs good, strong land, and should not be allowed to make a matted row, as it sets more fruit than it can perfect under ordinary conditions. Gandy and Enhancee, while very different in other characteristics, are both very late varieties. Brandywine, first introduced last season by Matthew Crawford of Ohio, is also of medium to late season. This is claimed to be a very promising sort. It certainly comes well recommended. Splendid is another candidate for recognition, which comes well spoken of. It is early to midseason. I would recommend this as a pollener for Warfield.

This does not cover all the varieties being grown in this locality, but it is enough for the length of this article.

DISCUSSION.

Mr. Brassington: Is Bidwell bisexual?

Mr. Rork: It has a perfect blossom; it bears very freely. It is the handsomest berry there is, in the basket, I think.

Q. Can you get the white tips ripened?

Mr. Rork: I never had any. Whether it is my soil or what, I don't know.

Mr. Morrill: One gentleman mentioned Manchester in his paper. Now, with us it never produced a good crop, because it would always rust and go down from the time you had one good picking.

Mr. Rork: I saw it on the shore. It had a beautiful blossom, but it was destroyed, as you say, because of rust.

Mr. Brassington: Have you compared Warfield with Bidwell?

Mr. Rork: I have not grown it, but I have seen it. Bidwell is much larger and better formed. I don't know about the productive qualities. Bidwell produces more berries, for me, and will average with almost anything. It is very productive and the berries are large and glossy. It has a long berry, once in a while; the first berry is flattened.

Mr. Morrill: It resembles Haverland very much?

Mr. Rork: Yes.

Mr. Morrill: I was wondering if you had the genuine Bidwell.

Mr. Rork: I originally was not in the farming business, but have always dabbled at it. When I got my strawberries, I had three varieties and set them out; after that, I wasn't near the place for some time, and when I returned I found the plants gone or scattered and mixed with weeds and briars. But there was that one variety which had fine berries wherever I found it. I was away two or three years, and lost my health, and when I came back I found that one berry which did not seem to care for soil, blackberry vines, or weeds, and wherever there was a stool there were fine berries. So I made a new bed of these plants. The vine was like Bidwell. As I have seen Bidwells elsewhere, they don't look quite like mine, but I don't know what else it is; it isn't Sharpless, and it isn't any of the others that I started, so I concluded it must be Bidwell.

Mr. Hale: I would like to inquire about Warfield. Are there two varieties?

Mr. Morrill: Yes, but No. 1 has been renamed, and No. 2 is the only kind that has been disseminated to any extent.

Mr. Hale: I have tried it every way, but it entirely failed to yield.

Mr. Morrill: Your land is just such as I have seen enormous crops of Warfield grown on.

Mr. Hale: I got it because it was recommended highly.

Mr. Morrill: Did you use some staminate variety with it?

Mr. Hale: I did.

Mr. Rork: The seedling of Warfield has a perfect blossom, and is very much liked, but I am inclined to think that on sand alone it will not come up to standard.

Mr. Morrill: Warfield No. 2 is a robust grower, but has short roots. It is peculiar in that respect, and it is a tremendous runner; and, a vine

getting started, and having roots an inch or two long, will produce fruit the next year, and they will load so enormously that they can not carry the crop through, if in matted rows; in narrow rows or hills, it out-yields anything, but suffers badly from drought. It may be that you suffer from dry weather in Oceana county, and in that case Haverland will undoubtedly surpass it.

Mr. Hale: I tried it three years in succession. With me, Parker Earle heads the list.

Mr. Rork: How does Warfield compare in size with a good Wilson?

Mr. Morrill: It is far superior when grown as I suggest.

Mr. Hale: Has anyone tried Lovett?

Mr. Rork: The catalogue recommends it highly.

Mr. Morrill: It is a very good berry; a really good berry.

Mr. Gebhart: What kind of soil did Mr. Welch grow Warfield on?

Mr. Welch: My Warfields were grown on good moist soil, and they have gone ahead, with me, every year, of any other variety. It is a good large berry and has stood the drouth as well as other varieties, considering the amount of fruit. Jessie picked a light crop, though it stood the drouth. Beder Wood, I think, it not quite so early as Michel's Early, but it is a good-size, firm berry. I have not grown Michel myself, because several of my neighbors have grown it, and said it was only good for one or two pickings, and Beder Wood is certainly a very productive berry; it is a light red in color, firm and round.

Mr. Burdick: What about VanDeman?

Mr. Morrill: It is a slight improvement on Michel's Early; is a trifle firmer, perhaps.

Mr. Burdick: I have grown it some, and have thought it was Wilson.

Mr. Morrill: It is a little longer and darker.

Mr. Burdick: I am using it for a fertilizer. What about Timbrell?

Mr. Welch: I have neighbors that grow it and they speak well of it. It has been of good size, productive, and late. There is one thing in regard to strawberries that perhaps we become confused on. I have set but few early varieties. There is no money in them for me. I want something that comes in the middle of the season and later, and I see that many are resetting where they have early varieties, and this matter should be taken into consideration, where a person is setting a bed.

Mr. Morrill: Do you like the manner of ripening of Timbrell?

Mr. Welch: What little I have seen of it, I do not. I have hardly proved it enough to form a just opinion. The first year of Warfield I was a little disappointed, but after that it proved good.

Mr. Rork: It colored well with me, but it showed scald.

Mr. Morrill: It ripens as though it had measles.

Mr. Rork: Last year, at the top of the berry, before it was fit to pick, it softened.

Mr. Morrill: It will do that, if the temperature reaches 100 degrees.

Mr. Rork: It was pretty warm; other berries, however, were not affected in the same way.

Mr. Rice: It has been suggested to me, by persons in the upper peninsula, whether it would not be possible to grow strawberries there, and to get good prices. They report heavy yields and fine quality, but it was questioned whether, coming into market after the season was about over,

they could get any price at all. Mr. Welch seems to indicate that he gets the better prices later in the season. Is this a general rule, or will people become tired of them and want something else?

Mr. Rork: With me the late varieties pay the better. I only failed once on late berries; I shipped them to Muskegon, and they were very fine, but they wrote to me saying there were blueberries and raspberries in market, and the returns were only moderate.

Mr. Rice: Would you recommend a man's growing them there and shipping here?

A. I should be a little doubtful.

Mr. Hale: Is there any late berry that is better than Gandy?

Mr. Rork: Enhance is not so late. It sets a great quantity of berries, begins medium and holds on quite well, but it is not so late as Gandy. Dew is of about the same season, and I prefer it a little to Gandy; Bidwell will bear more than either, and before they get into sight, and yield pretty well after they are in sight.

Mr. Morrill: I wish to ask Mr. Rork how long he kept Gandy in the same bed, to test it?

Mr. Rork: I have changed my beds; I have had several beds.

Mr. Morrill: Have you discovered that at three years old, Gandy is better than at one?

A. Yes, I think that is so.

Mr. Morrill: People who are setting strawberries should be careful, in setting two varieties, to get varieties similar in their habits. Some varieties, like Warfield, Haverland, Wilson, and a few more will produce the best crop the first year. Sharpless, Gandy, and others will do better at three years old; some are pistillates, some staminates; and if you expect to get the best results from the field, plants of like habits should be selected. A careful selection, with that in view, is essential. I think the best patch of Sharpless strawberries that I know, in this state, is nine years old. Gandys I have seen in excellent form at five years old. The first year I grew them (and I grew them when they cost a lot of money) I was much disgusted, but I kept them the second year, hoping they would be better, and they were. I discarded them, however; but a good many plants have been disseminated, and, in the hands of men who will allow the plants to struggle along for years, they have made their reputation. They are admirable in the crate, but you can not expect the best results until the second or third year. They require a good, heavy soil, and even then they are not heavy producers.

Q. What should be put in with Grandy? A. They don't need any other variety.

Mrs. Perkins: I would really like to ask if, when plants are set in August, they are ready to fruit the next year?

Mr. Welch: I haven't had much experience with August setting, but what I have had has been a failure. We choose the spring.

Mr. Rork: I began with fall planting, but I am cured of it. I never realized so much from it as from the spring. I never gained anything, and lost a good deal.

Mr. Hale: I don't think either one of the gentlemen has answered the question. She asked if they would bear.

Mr. Rork: She can let them bear if she wishes to, but I desire to prevent her setting them at that time.

Mrs. Perkins: Is it best to keep the plants back in spring, to avoid frost, by mulching or otherwise?

Mr. Rork: We never have tried that much; but what little we have seen, it appears to be a pretty difficult thing to keep anything back in the spring and make much of it afterward. You may keep the roots frozen, but the top of the tree will come out if the atmosphere is right. You may mulch them so deeply that nothing will get to them, and then you smother them so that they will not amount to anything; and if you keep it up you will only get a few feeble berries. I never have succeeded at it, and I am very skeptical about mulching.

Mr. Gebhart: I tried it two years ago on a nice patch, and mulched heavily with manure. Four rods of this patch I kept covered with mulch as long as I dared. I saw they were becoming white. I began to uncover them and let them have a little sunlight. Finally I uncovered them entirely. They grew very rapidly after they got the light, and blossomed and fruited about the same time as those which had not been covered, in the same patch. It did not seem to make any difference whatever.

Mr. Morrill: Did you ever suffer any loss by frost, where mulching was practiced?

Mr. Gebhart: I suffered a loss on those three acres, all over. It was mulched all over, except a little patch, and that came out better. They were tougher, and I picked from them the bulk of my crop; they seemed to be stronger and hardier, and produced quite a nice crop.

Q. That was on higher ground? A. Probably three feet elevation.

Mrs. Perkins: When plants are set three feet apart, in mulching how do you do, Mr. Morrill?

Mr. Morrill: I have had some disastrous experiences. I have read a good deal (more than I ought to, I think, sometimes), and I have done a good deal of work where I would better have saved my money and material; and one of the things which has proven the most complete loss, is the attempt to winter-mulch strawberries. I have made the greatest failure in strawberries, where I have practiced it. Perhaps my conditions are different. The next greatest failure is to attempt spring culture the bearing year. I came to the conclusion, after a few trials, that there was a good reason for it that I should have understood sooner. We are likely to get spring frosts after the bloom is started. If the soil is uncovered, it will absorb heat from the sun and air. That heat is given off during the night by radiation and often protects an open piece of land that has not been stirred, giving off a little heat, sufficient to save a crop. Where mulched, if there is any warmth in the soil the radiation is broken, and frosts strike through quicker. On my own place, a piece that was mulched was killed, while a patch within six feet, where not mulched, came through all right. Another peculiar experience I had, and I don't believe anyone can tell me anything about it, was mulching with clover chaff. I once mulched a large field with straw. I didn't have quite straw enough, but happened to have a lot of clover hullings. It struck me that they would be an excellent mulch, and I put them on. There was one

place, in working from the side, about the size of this room, where in wheeling the mulch in and spreading it we did not quite come together, and there was just that patch that was not mulched. The part mulched with clover chaff grew well, and everything went along finely for awhile, but almost every blossom blasted; it made a great growth of leaves, but no berries; but that little patch not mulched was full of berries. My own practice has been to mulch nothing until after the fruit has set and all danger of frost is over. Then I wheel the mulch in, the men get down on their knees and put it under the berries to prevent sanding. That is all the mulch I want now.

Mr. G. H. Haight: I never grew any berries except for my own use, but I have practiced mulching in winter and spring. All the benefit I received was to keep the berries clean and retain the moisture.

Mrs. Perkins: Is there any danger of getting the soil too rich, of the rains washing the clover into the soil, and thereby making a too vigorous growth?

Mr. Morrill: They might, but I have never heard of anyone getting the ground too rich. I have been on Mr. Louden's place, the gentleman who originated Jessie, and have seen there 160 to 200 varieties, on the richest soil I ever looked at. Ditches four feet deep are in a perfect bed of compost, and that has been loaded with fertilizers and stable manure until it is the richest garden land I ever saw. It is at Janesville, Wis. The vines have fruit stalks as large as a pencil, and I have seen berries picked there, fourteen or fifteen to the quart. The vines stand knee high to me. The foliage is enormous, and the fruit corresponds. I have no fear of getting Michigan soil too rich.

Mr. Hale: Did I understand you to say you had lost by spring cultivation?

Mr. Morrill: Yes, sir, I have seen damage from that.

Mr. Hale: Don't you practice any cultivation during the fruiting season?

A. Not until the crop is off.

Mr. Dykeman: Is mulching of benefit for retaining moisture?

A. That really was not my suggestion. I don't think it helps any in that; simply prevents sanding.

Mr. Rork: I wish to ask Mr. Morrill a question. You do not cultivate any, you say, until after you have picked your crop?

Mr. Morrill: Then I plow it under. That is the easiest way I can make money growing strawberries.

Mr. Rork: I find that too early cultivation makes them susceptible to frost, but I thought after frost was out of the way cultivation helped preserve the moisture.

Mr. Morrill: Sometimes you get in a position where you don't know just the best thing to do. Cultivation also prevents radiation, and the night may come soon after when you can't get the radiation out of your soil, owing to the mulch, and the crops are killed by frost. It is in a worse condition for two or three days than if it had not been touched. Another thing, the strawberry grows late in the season, and the last thing it does is to fill the surface soil full of roots that are going to do business. In cultivating, you are breaking off many of them, just as they are starting in to do their work, and you are asking the plants to

make new feeders. As a rule, we don't get a drouth that will hurt strawberries until about the time they begin to ripen, and at that time they need much moisture; and I wish to say that I think irrigation practiced on strawberries would be the greatest success of anything. It needs something to retain the moisture and prevent rapid evaporation; but with the cultivation comes also other results that have more than overbalanced its good effects with me. So I give the best cultivation I can the year the plants are set; get it into as fine condition as possible. The next year, pick a crop and turn the bed under, and I have grown 100 bushels of potatoes per acre on top of the vines the same season.

Mr. Dykeman: Mr. Morrill, did you say that cultivation made danger of freezing? I have been told that, and my experience was the other way. I have seen corn and potatoes freeze less where cultivated.

Mr. Morrill: That would be a new experience, to me. There is some local condition, probably, that affects that. I hardly think that can be a general condition.

Mr. Rork: I have observed, especially on our sandy land, that spring plowing disturbs the moisture. If I were going to plant an orchard, I would plow it in the fall and only cultivate it in the spring. You can not get the sand too firm. You stir it in the spring, and if you are a little late, you will get drouth.

Mr. Morrill: Now, suppose that is clay soil. We do not know what Mr. Houk's experience is based upon. We want to make that distinction and have it clearly understood, between heavy land and light loam.

Mr. W. H. Barry: Mr. Houk's land is heavy and that would make a difference. I know he advises spring and fall plowing, on the same piece of ground, for raspberries.

Mr. Dykeman: I have cultivated corn with my mittens and overcoat on; and it froze quite hard, yet where I cultivated it was not killed.

Mr. Beadle: Five or six years ago, we had early potatoes planted near the house, and I had the same idea this gentleman has; and so we worked the ground thoroughly and covered them up pretty well, and as far as we got the man to work through that night, we had good potatoes, and the rest did not amount to anything.

Mr. Morrill: There is a good point in your experience. You covered your potatoes.

Mr. Dykeman: My theory is that breaking the ground lets out more steam.

Mr. Morrill: Prof. Kedzie would tell you that you would prevent evaporation, check it.

Mr. Dunwell: Would this spring cultivation have the same effect in the orchard?

Mr. Morrill: You have reference to the action of frost. I think there are numerous cases where peaches have been killed, so far as they were worked, within twenty-four hours.

Mr. Morrill: A frost on a damp night, when there is abundant dew, and the water forms in drops on your strawberries—on such a night your damage is slight or nothing. But have a dry condition and then get frost, even a light one, and you know where you go. The more moisture, the safer you are. The moisture takes the frost out gradually, and little or no damage occurs. Another time, perhaps you will call

it a black frost. There isn't moisture enough in the air to deposit anything. When it thaws out, everything wilts. The more moisture in the air, the safer you are; there is no question about that; I think that is the general opinion of people who have watched it. How many of you have gone out in the morning, where you have been plowing, and where you turned the furrow over have found it frozen to a crust, yet you could not detect a crust where the next furrow was to run. That would rather dispel that theory, because I think, as a matter of fact, that it is a theory. I never saw freshly plowed land but it was more liable to freezing than other.

Mr. Rork: There is one other thought in this. In the moisture escaping, there is heat given off.

Mr. Welch: Whenever we have had a spring that was quite moist, I have noticed that we never had our strawberries hurt by frosts. Last year, when the warm weather came on, I thought we were past the frost point, and I plowed a portion of my orchard just before that frost, and my neighbors on each side had not plowed theirs yet; and right in the orchard I have one piece of ground that was sown to crimson clover, which I skipped. That part of the orchard was completely loaded with peaches; and one orchard, on the one side, did not have a quarter of a crop, and the other, on the other side, had about half a crop. One of my neighbors went home and cultivated his strawberry patch. There was only a fence between his patch and the strawberries of his neighbor, but the neighbor had lots of strawberries and the man first mentioned did not have enough for home use. I am pretty well satisfied that it is best not to disturb the ground until after the danger of frost is over.

Mr. Monroe: Last year, at South Haven, there were at least a dozen orchards that were cultivated, in different neighborhoods; and in nearly every case, those who cultivated lost by frost. In one case a man cultivated half his orchard and half remained uncultivated, and on that that was uncultivated he saved his crop.

Mr. Morrill: I have seen similar things so often that I supposed it was a fixed rule.

Q. Is it well to wait to cultivate small fruits until the danger of frost is over?

Mr. Morrill: I am careful about cultivating them when I think there is danger of a change in weather. I am speaking now of small fruits, such as blackberries and raspberries. But if we have had a cold period, two or three frosty nights, after we have had the third I am always free to go ahead, because we know it is going to be warm for three or four days. I have been very successful in avoiding these little dangers for a number of years, since I have practiced a few such things as that. But the strawberry I let entirely alone. This discussion is very interesting to me, and to a good many people, but it leads us into the study of several things of which the successful fruit man understands the importance. Condensation, evaporation, radiation—all these things he must understand to work intelligently in fruitgrowing, and the day has come when, to make very much of a success, we must have a more or less clear idea of all these.

THE CANNING INDUSTRY.

BY MR. A. W. SLAYTON OF GRAND RAPIDS.

Did any of you young chaps ever attend an old-fashion apple-paring bee, fifty years ago? No? Well, then, notwithstanding your 'phones and your wheels and your base ball teams, you have not had all the world has had worth living for—not yet, nor have I; and, since all our thoughts must be of what is coming or of what is past, it is well to reflect that the thoughts of the future are mostly airy nothings. Not one in a thousand will ever materialize, while thoughts of the past may float in the ethereal "what might have been," or may rest on the bed-rock of what was, and so be a tangible reality, a ponderable substance, to be seen, heard, tasted, enjoyed by the senses we now possess. Looking backward, there is the old log house with its big kitchen, dining-room, and parlor all in one, with the open fireplace at one end, and its swinging crane and dangling pot-hooks parting the leaping flames of a generous fire; while the black teakettle simmers on a bed of coals at one side, its heavy lid rattling time to the merry rhyme within; at the other side sits sedate pussy, watching the ascending sparks and expressing her happiness in a contented purr, while black Carlo snugs down near by, his outstretched nose between his two paws, his hazel eyes opening now and then seeming to ask, "Am I in the way? Won't you sit down?"

It is an evening of the early November of fifty or more years ago. All the boys and girls of the neighborhood (there were boys and girls in those days) have been invited to the paring bee, and they come early, for they are all willing to work, where there is more fun than work; and, being seated in a row around the room, it somehow happens that a pair of boots are in front of each alternate chair. Verily, the p-a-i-r pairing has begun.

Empty pans or tins and sharpened knives are passed to each guest by the mother of the house, while the father fetches in baskets of apples and keeps all well supplied. At first all begin at paring, but soon it is seen that the girls are the best at that and the boys are set to cutting and coring, and thus an economic excuse appears for each boy to be seated by the side of some girl. I opine that it was at such a bee that Darwin evolved his theory of natural selection.

You, John, were set to stringing the quarters, and with a big darning needle and twine and a half hour's work you succeeded in getting a string a foot long, and you pricked your fingers so much, and had to have the needle threaded for you so often, that Samantha was sent to help you—that is, to do the stringing while you laboriously held the end of the string. Awkward Jacob cuts his finger, and ready Rachel tied it up with such a dainty rag and smile that I half wished it was my cut finger. It is nearly 9 o'clock, and there is but one basket more, so fun comes in faster. The girls try to see which can pare an entire peeling from stem to blossom without break, and Susan first succeeds. She steps to the middle of the room, takes the long peeling by one end, swings it around her head three times and drops it, and all see that it has formed a good letter S on the floor; that means that the lucky one's name begins with

S. Sam! Sam! is called. So, smiling, smirking, simple Samuel steps softly, smacks soundly sweet, simpering Sue; she squeakily, squawking, squarely squirming squeamishly. Were you ever there?

Soon the ten bushels are pared and strung, enough for nearly a barrel of dried apples; the dishes are cleared away, a big pan of doughnuts is passed around, and then an hour is spent at "snap-and-ketch-'em", "hold fast all I give you", "marching to Quebec", "crossing London bridge", and occasionally "going to Rome". Should you visit that home on the morrow, or for a week, you would see those strings of quarters hanging in clusters near the chimney and the windows, dependent from poles overhead—fragrant festoons, foreshadowing full family feasts for the future. Weeks afterward, the five-pail brass kettle holds sway in the chimney corner two nights and a day, soaking a peek of the dried fruit one night, cooking it slowly next day, cooling off next night; and this being well seasoned with boiled sweet-apple cider, furnishes sauce for the table and for pies for a fortnight.

Other fruits, peaches, plums, cherries, were either dried on tins near the fire or in the tin bake-oven before it; or they were "done up" in preserves with sugar, "pound for pound." 'Twas rich sauce and good. But what days did our mothers spend cooking over the sweets to keep them from souring, or in looking over each piece of the barrel or two of dried fruit, several times the next summer, to banish intruding insects!

Good bye, old-fashion paring bee! Gone, gone with the threshing flail and the flax wheel.

Fifty years ago no human being had ever tasted canned fruits or flesh. Dried fruits and salted meats constituted the only variation from the local products, and the only supply, out of season, on land and sea the world over. Some silent peaceful revolution has changed those methods in every civilized household throughout the world. Scurvy, that scourge of the ocean, is nearly driven from the face of the earth. Now, the arctic explorer, climbing for the pole, breakfasts on fresh lamb from Chicago, dines on sweet corn from Maine, and sups on green peas from Hart. The missionary in far off India varies his fare of boiled rice with salmon from the Columbia or peaches from Michigan. The dweller in Sahara may occasionally forego his dried locusts and partake of plums from Oceana.

Do any of you remember that picture, in the old Olney's geography, of a pigtailed celestial bearing a long bamboo on his shoulder, from which dangled by strings tied to their tails, many quadrupeds, and underscored "Chinaman peddling rats and puppies for pies?"

Now, whether that picture ever prevented my volunteering to go as consul or ambassador to China, I can not say; but I do think that if the next administration teases me to go, that I shall take for pie timber a plentiful supply of lake shore fruits.

Away back in the forties there lived in the southwestern part of the town of Macedon, Wayne county, N. Y., near Mud Creek, a queer, quaint, quiet Quaker by the name of William R. Smith; queer, because he took to growing nursery stock, and trying new ideas, and he was an Abolitionist; quaint, because of his queer name, and quiet because he was a Quaker. My father then lived two miles from him. About 1845 or '6, Mr. Smith conceived the idea of preserving fruits for future use in a fresh state,

by in some way excluding atmospheric influences. After three or four years of experimenting, perfect success crowned his efforts, and he published the methods in the Rochester papers, the Genesee Farmer, or the Rural New Yorker, one or both. He took out no patents, but earnestly urged others to try the new process instead of drying.

The first fruit cans I ever saw were brought from Rochester by Mr. Atwood of Kent county, Mich., in 1850, and the following winter I had the pleasure of seeing a can opened and of tasting of pretty good fresh peaches in January, a miracle then. At that time the process was to fill the tin cans with the prepared fruit and a little water, immerse in kettles or boilers of cold water three fourths their depth, heat to boiling, and continue twenty minutes; then remove from the fire, place on the covers and seal by filling the deep channel in which the rims of the covers rested with melted wax. Often, as the cans cooled, the half cooled wax would be forced by atmospheric pressure in among the fruit, making it necessary to keep a constant watch and to replace it. In 1858 the first glass cans were brought to Grand Rapids, but the sealing process was the same. About 1865 or '66 the melted wax sealing gave way to rubber bands and screw caps for both tin and glass cans; and observing house wives soon found it far more convenient to cook the fruit in bulk, and with dipper and fruit funnel fill the cans with the hot fruit, the cans, if of glass, standing in hot water or being wrapped with a thick cloth saturated with cold water. But little change in methods has taken place in the last twenty years, but the practice has become so universal that now there is hardly a man, woman, or child in any civilized country of the world whose food, pleasure, and health have not been greatly improved by the canning process.

Last fall I was at a small factory at Fairport, N. Y., and was told that they made \$5,000 tin fruit cans every day. I did not remind them of the fate of Ananias, but for fear of learning bad habits came quickly away.

When I think of the great canning industries in most of our states, and of the greatly increased consumption and consequent cultivation of fruits—when I compare the present household methods with those of fifty years ago, the better general health, and the greatly increased longevity, I feel that much of the improvement is due to the labors of that humble Quaker, and that high by the side of the names of Fulton, of Morse, of Howe, of Edison, should be written the names of William R. Smith and his estimable wife.

Not one person in a thousand of those who are now benefited by the canning process, knows even the name of the inventor. Do not we as growers and lovers of fruit, does not our country as being greatly benefited, does not the world, owe a monument to the memory of William R. Smith?

DISCUSSION—THE CANNERY AT HART.

Mr. Rice: When Mr. Slayton commenced his description of that scene, I imagined it was western New York. In regard to William R. Smith. I wish to add to the tribute, not to him, but to his wife. That was as much due to Mrs. Smith as it was to him. I worked for him when I was

sixteen years old, in 1850, and they put up then one can of fruit for every day in the year, and it was looked upon with the greatest wonder, that there was fresh fruit for every day in the year. They used quart tin cans, the same as now, and the cover was sealed on with solder, as now, a pin-hole being left in the center. When it was just in the right condition, after boiling some time, a drop of solder was put on the pin-hole. Shortly afterward came the glass cans or bottles, which were the wonder of the people. Then they made an experiment. They wanted to see whether it would stand shipping, and a friend of the Smiths, who was an ocean captain, carried some of it to Europe and brought it back; and that story was told everywhere, that the fruit had been shipped to England and back again, and had stood the journey.

Mr. Morrill: It has occurred to me as rather remarkable that new canning companies are being organized everywhere, while the old canning factories at Baltimore, along the Chesapeake bay, and all through Maryland, are idle, and could be bought at twenty-five cents on the dollar. The industry is being extended in Michigan, and I understand that you have recently put in a factory here for canning vegetables and fruit. These are things which are very pertinent for you to discuss at the present time, and I wish you could hear something of the success of canning as it has been started here.

Mr. Markham: We have an industry of that kind here and we think it means business. Two years ago they canned an immense lot of stuff; peas seemed to be the main article, although we canned everything we could get in the shape of peaches and plums. I sold them my peaches; they also canned apples, but last year we were out of apples. We think everything of the factory and believe that it has come to stay and will be useful. I was well satisfied with my sale to them, of peaches; they were pretty nearly all one variety.

Mr. Morrill: Did they take first-class fruit?

Mr. Markham: They took mine, just as they ran, except culls, and they paid me two shillings for those. They gave me seventy-five cents right through, that year, delivered at the factory. I drew eighty bushels in one day with one horse. I was well satisfied; some thought I might do better, but it saved a lot of work. I can do a little better with my plums elsewhere than with them. They paid \$1.25 that year, and I am inclined to think that, when we have a good crop, that would be a good price, though I think I can do a little better. But if I have a crop of peaches and they will give me seventy-five cents, they will get them.

Mr. Burdick: If I can get seventy-five cents at the factory I shall not bother much about shipping.

Mr. Rice: Mr. Markham stated that his peaches were all of one variety. What was that variety?

Mr. Markham: Mostly Chilis, and they considered them as good stock as they could get.

Mr. Morrill: I think Mr. Willard has said that is the best canning variety in the world.

Mr. Burdick: They are if you give them water enough. They want water.

Mr. Brassington: For two years we have been interested in this vicinity in the canning factory. The principal crop canned has been peas. To

the farmers generally it has been beneficial and rather profitable. I have grown a few acres every year. The first year I had eight acres, last year about four, and the profit per acre, above all expenses, was \$25. Of course, we are out nothing; we get the seed from the canning factory and we don't pay anything down for it, and when we settle up this is taken out. There is no investment except the farmer's labor and the use of the land. Last year I sowed, I think it was the 17th of April, and the 17th of June I brought in a load of green peas. In sixty days I got my \$25 per acre. Not later than the 25th of June, everything was harvested and I had my money. It really has been, as a rule, quite profitable. Some of the farmers in this vicinity have made considerable more. I think the maximum runs up to \$45 or \$60 per acre, net; but this was medium soil of mine; the soil had been run somewhat when I got the farm, and it was rather a light soil for peas.

Mr. Morrill: What is the best variety?

Mr. Brassington: The best variety, taking into consideration the bearing qualities and canning qualities, is Perfection. It yielded the best with me, and they liked it best at the factory.

Mr. Morrill: Is it a dwarf or half-dwarf?

Mr. Brassington: It would come under the head of half-dwarf; it is a little taller than either Little Gem or American Wonder. It does not fall down at all, and bears more pods than any other variety. I tested six of the leading varieties, including American Wonder and French Canning, and this pea carried more pods than any of them and yielded more per acre.

Mr. Morrill: Are they subject to any difficulty here? A. Not the least.

Mr. Morrill: Subject to insect depredations? A. Not any.

Mr. Morrill: Have you tried to raise seed?

Mr. Brassington: I tried to raise seed a year ago. I sowed the seed last year, and found that there were many little holes in it, so I started a little patch, and not more than one quarter of the seed grew.

Mr. Morrill: You can treat your seed with bi-sulphate of carbon, otherwise I think you industry here will be injured.

Mr. Brassington: The canning people get their seed from the northern portion of the state where they are very free from the bug and blight.

Mr. Rice: Do you sow in drills?

Mr. Brassington: No. I sowed broadcast and then took a spading harrow and went over it thoroughly (the object of the spading harrow was to prevent the peas rolling into furrow), and then I plowed them under, five inches deep. The great difficulty I experienced last year was from frost. I sowed quite early (I think it was the 10th of April) and that heavy frost in May hurt my crops.

Mr. Morrill: Such a feeling as that is very exceptional. How about the harvesting?

Mr. Brassington: That is quite a problem. Of course, it is expensive, if you have to mow them by hand or rake them off; but there is a better way that is generally practiced here—to smooth the ground with a smoother, or roll it thoroughly, and then mow it with a mowing machine; still, in a dry season, I think that does harm, as it has a tendency to make

a crust; so, when my peas come up this spring, I shall put on a little light drag, and dragged the ground.

Mr. Morrill: Breed's weeder would be the thing for them.

Mr. Brassington: Yes, that would be just the thing to prevent the soil from crusting over, and to prevent evaporation. Of course, the pea crop is something that is seriously affected by drouth when it is nearly ready to harvest. They ripen and harden so rapidly that it is almost impossible to harvest them so as to get them into the factory in proper condition; and if there is any way to prevent that by retaining the moisture in the soil, one should resort to it.

Mr. Reid: How are the pods stripped from the vines?

Mr. Brassington: They have a threshing machine at the factory here.

Mr. Morrill: How would the old-fashion self-raking reaper work? A. I think it would be just the thing. The ideal implement.

Mr. Rice: Do they all ripen at once? A. Yes, unless you sow them at different periods, and then time does not always help them out. They seem to ripen about the same time, whether sown earlier or later; but a variety will help you out, and they intend to have at least two varieties, so as to prolong the season of ripening. It is difficult to harvest them in time.

Mr. Morrill: Would it be with proper tools? A. Perhaps not.

Mr. Rice: What would be your second variety? A. Alaska.

Mr. Morrill: Have you any ideas as to how to secure uniform ripening? You know that is one trouble, to get uniform ripening. It lies in the perfect preparation of the soil and accurate planting as to depth and width.

Mr. Brassington: And perhaps you could regulate the depth better by planting the seeds with drills.

Mr. Morrill: You can; that is why I asked that question.

Mr. Brassington: If I had a drill, I would thoroughly fit my land before I drilled in the seed, but would plow the land in the fall so as to get all the moisture I could, and thoroughly fit it in the spring by harrowing, and perhaps I would then roll them and go over it again with a Breed weeder, leaving the surface perfect and clean, so I could use a mower or weeder.

Mr. Morrill: Breed's weeder would destroy the weeds and prevent the grass from forming. What has been said brings out one fact that I always like to figure on. Mr. Brassington places a minimum net profit on his work of \$25 per acre. While that will not satisfy a peach or plum-grower, when you stop to think you find that would show that that land was paying interest on \$300 per acre for the year he grew that crop. In any other business, that would be considered a most excellent investment. Any crop that nets you \$10 per acre, from a commercial stand-point, is a good thing, and there is something to figure on there. We don't like to talk about \$10 per acre, net, in any horticultural crops; but at the same time, any crop that will do that is a good thing.

Mr. Markham: When pea harvest begins, we talk peas here, continually, all of us. Two years ago the crops obtained seemed impossible; last year we had a drouth to contend with, which was pretty serious in some places, but I am surprised that, with as many raising peas as there are here, more of them do not become as enthusiastic as I do.

Mr. Morrill: Let me suggest another thing; we are very familiar with the canning industry, and Acme is the poorest possible tomato for canning, because it "waters" badly and Beauty goes with it; and repeated tests have shown that they may can them and give them solid packing, and in thirty to sixty days they will open up and "water" badly. Early Harvest has much the same fault; you want something as hard as Perfection or Favorite, or Stone. Stone is one of the very finest, and so is the New Livingston Red. They will remain solid packed. I grow from ten to forty acres each year of tomatoes. I have been for twenty years at it, and quit within the last year. I have the Chicago market and two canning factories, and have been between two fires, to grow a tomato for the factory and for market. If I grow what the factory wants, my only course is to contract, and I don't really like the figures, for the Chicago market often proves the best. I took as high as \$500 per car on Chicago market one season (1892), but at the factory they pay us \$8 per ton, and we will run from six to twelve tons per acre.

Mr. Burdick: I am a canning factory man. I am glad it is here, and I will say that if you stand by them, they will stand by you, every time. When we commenced, they wanted us to contract to raise tomatoes. We did not know anything about it but we finally concluded to try it, even if we did not make a cent. We wanted the factory and we found we had to give them some encouragement, something they could rely on, to get it here; I contracted tomatoes, string beans, and peas. When they come to get the string beans handled, the "Yankee" help would not work; it was talk and play, and one thing and another, and the beans were not taken care of. I noticed one day a pile of string beans thrown out back of the factory. I said, "What does this mean, are you throwing them out?" [There they were, paying us for them and throwing them out.] "Yes," he said. "Well," I said, "I don't want you to take any more of mine." He said that it was impossible to get them dressed; that it would be necessary to secure old-country help. I sold tomatoes last year for good prices, \$1.80 per bushel I started in with, and the last I got was thirty-five cents, so the factory did not stand in my way last year, on tomatoes.

Mr. Markham: It is the same here as anywhere. A good many farmers, if they think they can do a little better, don't want to contract with the canning factory; if they get in a pinch, they will go to the factory, which, of course, is not always in shape to take them. The factory is at quite an expense; it costs some money to start it. They are business people, and I think it is one of the grandest things we have. Last year everything was wrong, nothing worked right at all; but two years ago we certainly were enthusiastic over the canning factory.

Mr. Burdick: It was a dry season last year, and the peaches clung to the stones so that it was almost impossible to dress them, and they finally had to give it up.

Mr. Gebhart: I would like to ask Mr. Burdick in regard to prices. Did you sell to the canning factory at those prices? A. No, they were not working that year, last year, with tomatoes. In regard to the small fruits, they will not have anything to do with them for canning, but they will take most of the peaches and plums.

CURRENTS AND GOOSEBERRIES

BY MR. EDWARD HAWLEY OF FENNVILLE.

Few persons, even among our professional horticulturists, fully realize the vast strides that have been taken during the past quarter century in the demand for good fruit on the part of the consumer and in the efforts on the part of the producer to keep pace with that demand. It seems but a few years since the only fruit universally met with in our smaller markets was the apple. Fruits now considered indispensable—pears, peaches, plums, quinces, and grapes—were then produced in limited quantities and only in specially favored localities, and were to be found on sale in none but the large markets. Strawberries, raspberries, and blackberries were known only as wild fruit, and the currant and gooseberry were confined to a few sorry-looking bushes in a secluded corner of the farmer's "garden"—that little patch of a quarter of an acre or so, securely fenced with pickets, wherefrom the farmer's table was supposed to be supplied with the necessary vegetable diet. In those good old days, "befo' de wah", if a man should have announced an intention to plant currants and gooseberries by the acre, expecting to find a market for the fruit, he would have been promptly placed on the list of cranks, and as a matter of fact commercial growers of these fruits were not to be found except in the immediate vicinity of the large cities. How changed these things are now we all know. Large farms are entirely devoted to small-fruit culture, and the despised currant and gooseberry of a former generation are now taking a front rank among the indispensable fruits, and, notwithstanding the extensive plantings of the past few years, the supply has not yet caught up with the rapidly increasing demand. And allow me to state here that the fear of overproduction of good fruit of any kind is something no grower need vex his mind about. It is one of those things that possibly can, but probably never will, be done. The writer well remembers some forty-odd years ago of choice Spitzenburg apples selling in New York city at retail for one dollar per barrel. The apples came by way of the Erie canal from western New York, and the cost of barrels, commission, and some 300 miles of freightage reduced the net price to the producer to less than 50 cents per barrel. Yet the profits were considered in those days sufficient to warrant the extensive planting of new orchards throughout that portion of the state, and the wiseacres then, as now, foretold the dire results that were sure to follow. Then, as now, their prophesies came to naught. The average price of good apples has continued to advance from that day to the present time. Let our fruitgrowers ponder well the lesson.

The currant and gooseberry are by no means fastidious as to soil or location. Of course, the land should be well drained; if not naturally, then by underdrainage. Air drainage is of minor importance, as these fruits are seldom injured by extreme cold. I know of no fruit that responds quicker to heavy dressings of manure. An amount of fertility that would kill a peach orchard will not injure the currant or gooseberry, but will greatly increase the size and quantity of the fruit.

Among the many varieties of currant and gooseberry, comparatively few kinds should be chosen for a money-making plantation. Of currants we find a great difference in varieties in ability to resist the borer. The difference consists in the greater robustness of growth and harder wood and smaller pith which some varieties possess. By selecting these varieties, which fortunately are among the most prolific bearers, the dreaded borer will be able to make but little impression on the plantation. I give a list of four varieties which a somewhat extensive experience has proved most profitable with us in the order named: London Red, Victoria, Prince Albert, and Long-bunch Holland. The last two are extremely late and the picking of them can be deferred until the height of the season is over, often bringing a better price than the earlier varieties. Both white and black currants we have discarded as unprofitable, though if we could get a strain of blacks that would bear, there would be money in it, as the price is usually higher than for the reds.

The red currant bears its fruit on spurs which are the more numerous at or near the junction of the wood of different years' growth, which fact should be borne in mind while trimming. If the new growth is cut back each year to within three inches of the old wood, the bush will be found plentifully supplied with fruit spurs throughout the entire length of the canes, and will be in shape to bear a maximum crop. As to the suckers that start from below the surface of the ground, they should be removed each year unless required to form a new bush, as sometimes happens when the old stem becomes injured or broken off. Some growers destroy the suckering habit by cutting the suckers on the young bush close to the main by using a thin chisel. We prefer, however, to have the suckers for the reason above mentioned.

The only gooseberries we have raised to any extent as yet are the Downing and Houghton, both reliable and prolific varieties. Most growers prefer the Downing on account of large size and fine appearance. Our experience, however, leads to the conclusion that Houghton is fully as profitable a berry, all things considered, as the spines are more flexible and the skin tougher, two qualities which will be appreciated when harvesting, for in the case of Houghton the berries are easily stripped from the canes with no danger of bruising and are then passed through a fanning-mill to clean out the small berries and leaves.

The insect enemies and fungous diseases of currants and gooseberries are easily combatted—if we except the borer which, as stated above, we can afford to ignore if the proper varieties are planted. The green worm that appears early in the season is easily destroyed by spraying with hellebore or a weak Paris green mixture, hellebore being preferable if a good article can be obtained. But the quality of this drug can not always be relied upon, and recourse must then be had to Paris green. We think it pays to use the Bordeaux mixture in connection with the insect poisons as a preventive of the leaf fungus, which sometimes causes August leaf-dropping.

Our experience would lead us to recommend the following practice, of course modified by the necessary variation to suit soil and circumstances: Secure your trees and prepare the soil in the fall and plant as soon as the frost is out in the spring. Plant in the row eight feet apart and four

or five feet in the row. Start the head at or very close to the ground, training it in saucer shape, thus giving the sunlight plenty of chance to reach the ripening fruit. Prune vigorously from the first year, cutting the new growth back to about three inches. Cultivate early, shallow, and very often. Spray with the first appearance of the currant worm. In regard to profits: In a well cared for plantation an average yield of 125 cases per acre can be relied upon. The cost of picking currants is 20 cents per case, and of Houghton gooseberries 10 cents, while the market price during the last ten years has ranged from 75 cents to \$1.50 for gooseberries and \$1.00 to \$2.75 for currants.

If the future has in store half the profit that the past has shown possible for these fruits, we can truly recommend the planting of them on a par with peaches and plums.

DISCUSSION.

Mr. Morrill: How does Houghton compare in size with Downing?

Mr. Hawley: Houghton is a smaller berry, and when it is ripe it is red. Downing is a greenish berry in its ripening, and larger, and brings a better price in market. Q. Why do you recommend Houghton in preference to Downing? A. As stated in the paper, we have found, in our experience, that the Houghton can be harvested so much more cheaply than Downing. Downings are hard to pick. The Houghton bushes can be stripped. The method employed is to strip the berries from the bushes with a gloved hand and run them through a fanning-mill. With Downing, you can not do this. Of course, you save in the harvesting, in this way; and then, too, they are more prolific with us.

Mr. Rork: Have you tried Chautauqua? A. We have experimented very little beyond these two varieties. We tried Industry, but gave it up as a bad job.

Q. Did you plant Industry in the shade? A. No, sir.

Q. Is your gooseberry land high and dry, or low, moist soil? A. Our whole plantation is on clay loam, and it is not the best land in the world for either currants or gooseberries. Until our wet season, it worked finely. In 1891 the older bushes were nearly destroyed; but at three years we reaped our greatest harvest of currants, and part of the bushes did not produce that year the amount of fruit they should.

Judge Russell: What is the best land?

Mr. Hawley: So far as my experience goes, the best land for the currant is the best land for the peach tree. In Fennville (west of Fennville) there is a strip of land which is gravelly and very rich, and it raised the best peaches in that country, and the best currant bushes. We have not experimented extensively, and yet I have seen these currant plantations growing through that section, and last year they all made the best growth of currants I ever saw.

Q. What variety of currant do you recommend? A. Why, so far as I have seen, and so far as we have raised them, Prince Albert is the best currant that grows, and probably the reason it is not more widely planted is because it is the hardest currant to raise in the nursery. The

nurserymen can not raise Prince Albert and sell it with the other varieties.

Mr. Reid: I would like to ask if you have tried any of the English varieties? A. Everyone knows that they can raise gooseberries in England that would surprise us. We can not raise gooseberries here which at all compare with them. There is an Englishman living near us who has experimented a good deal and he claims to have one variety that he can produce here.

Q. Which variety is that? A. I don't know, in regard to that. I presume it was Industry.

Q. Is it not a fact that the reason that the English gooseberry mildews so much here, is that the shrub is kept fruited too near the ground? A. I should think that would be the case. It might be that, if we could raise them high enough, they would be all right. I have never seen them except in the bush form. Perhaps they raise them in England in the tree form.

Mr. Wright: I think I can find them in America, where the bush has been in the first place partly neglected and allowed to grow up into the air, and then made a second growth, producing what I call an independent trunk. Berries that grow on the top part of the tree are not affected with mildew, but the berries on the shrub (the bottom part of the plant) will be mildewed every time. I think if the people who undertake to grow gooseberries, whether they be of the English or American varieties, would prune them into tree form, and give them proper circulation of air underneath the bush, they would avoid the mildew that the English fruit is subject to here.

Mr. Morrill: Does any one in Michigan produce them successfully? A. Not in Michigan, but in Ohio they are produced successfully, both Industry and Lancashire Lad.

Q. But Industry has been a failure all over this state, with all sorts of treatment? A. It is not a failure in Ohio, but they are Englishmen who raise them, men who understand the proper cultivation in tree form. The English gooseberry is raised in tree form at home.

Mr. Gebhart: Is it not a fact that Industry is inclined to grow down and crawl along the ground? For several years I have tried it and I had an excellent crop of berries the first two years; but since then they are inclined to grow down and lie on the ground, and they have mildewed, even with spraying them half a dozen times. Now, the Lancashire Lad bush (my experience is limited) seems to be more of an upright grower, and I have had some fine berries. Also Champion, which is a great producer.

Mr. Morrill: Columbus is also promising and said to be an American variety.

Mr. Reid: If you take the precaution to keep the old wood pruned sufficiently far from the ground, and keep the bottom limbs somewhat pruned back, it will prevent them from drooping so much on the ground.

Mr. C. E. Rollins: I have an experimental patch, set with gooseberries and currants, and I have some in the tree form, and also in the bush; those in the tree form are probably eighteen inches from the ground, and are not troubled with mildew. By keeping them trimmed up, the new

growth, and the tops trimmed off, I did not have a pint of mildewed berries last year. They were very large and fine. I have six varieties of the currant, and Victoria does the best. I have trimmed them every year back to about four to six inches.

Mr. Morrill: Have you London Red? A. No sir, I haven't; I have Red Jacket.

Mr. Morrill: I have reference to the currant. A. No sir; Prince Albert, Victoria, Holland, and Black.

Mr. Morrill: Have you North Star among them? A. No, sir.

Mr. Anthony: I have had experience in some lines. I have grown currants and gooseberries the last twenty years. Downing is the leading variety with me. I think that with some varieties an attack of mildew is almost unconquerable. I am growing the Downing which originated in Mr. Downing's garden. I obtained the plants from him, and so far they have been very free from mildew; and that is the strain I am growing and offering now.

Mr. Morrill: How about currants—what does best? I have grown Fay successfully, and am growing Victoria and Prince Albert now. I hear that they are very good, and I hear Wilder spoken of highly.

Mr. Brillhart: I am yet pretty young in gooseberry-growing. I have Downing. I have not planted any other kind. That is good enough for me. I set some 360 plants, one spring, and that same season I picked 37 quarts from them, and the next spring 43. They were nice plants, two years old. I got them from Mr. Willard. The bushes made a tremendous growth, two and a half to three feet across the top. I think next summer there will be a good crop, 12 to 15 quarts from some of the best bushes. They all look about alike. Last spring I set out 1,900 more, and I intend to continue. That is the only variety I have tried. They are very large, and nice enough for anybody.

Q. How about currants? A. Well, in currants, I have Fay, Victoria, Prince Albert, and Wilder. Wilder is something new to us here, but has made a tremendous growth, far ahead of Victoria, and that grows fast enough for anybody. It is a very strong grower, and I believe it is a very promising currant. It has fruited twice in this section.

Q. What is the size of the berry? A. The currants were larger than wild cherries, a half larger than Fay.

Q. As large as a good sample of Cherry currant? A. Better than Cherry currant. They were very full. I think, if we measured correctly, they measured five inches through and seven inches long—that is, a solid mass of currants on the stem. I never saw such a sight.

Q. Did you or Mr. Gebhart count the berries? A. No, I did not count them, but in size the bunches were about twice as long as Fay.

Q. But Fay is long sometimes and short others. A. Principally "short others." For Fay, I can say that I have picked from a quart and a half to three quarts, or three and a half, from one bush. I picked them this season after the frost was over. Victorias run from twenty to twenty-six berries on a cluster; Long-bunch Holland something the same, and Cherry from ten to fourteen, and Fay goes from nothing to pretty good. I can say of Wilder that if anybody could see it as I saw it, he would not choose anything else; in fact, I sent in my order for 750 of them at ten cents

apiece. They will cost me \$75, and I am well satisfied. They are nice plants, varying from a foot to a foot and a half when I get them, and they are very strong growers. Before I set them out, I made 940 cuttings, and there are 600 still growing. Off from the Wilders I cut 4,000 more this fall, and they were the only currants that were set last spring that made any growth at all. Victoria, set right next to them, made all the way from six inches of growth to a foot, and Fay came next; they made from three to five inches growth.

Mr. Reid: I would like to have Mr. Wright tell us of the character of the soil in Ohio where they grow the English gooseberry so successfully.

Mr. Wright: The soil in which those gooseberries are grown is a mixture of clay loam and gravel.

Q. Pretty moist? A. Not over and above. It is subject somewhat to drought; but we, as growers of the gooseberry, find that the gravelly hot soil is best, with a sufficient addition of barnyard manure as a fertilizer.

Q. The climate, you say, is subject to drought somewhat? A. Somewhat, the same as in Michigan.

Mr. Reid: The reason I ask the question is that there seems to be a disposition among those who have spoken, to refer to mildew as the result of branches being near the ground, and the ground being too moist. The scientific investigators all say that the cause of mildew is our excessively hot and dry summers. The gooseberry succeeds better in the moist climate of England. When I have seen mildew it has been on top of the bushes, as much in one place as another.

Mr. Hanson: I have two acres of rather damp ground. Shall I plant them to gooseberries and currants, or black and red raspberries?

Mr. Wright: Just one moment. As regards mildew, we base our theory upon the fact that we are subject in England to mildew on our grain crops, in the same proportion, or more so, than you are here in your small fruits, and whenever we get a mildewed crop of wheat, we get it all in one night, and we get it on soil that is subject to an under current of water, land which can not be sufficiently drained. It is claimed that the hot air that prevails at that time, and the evaporation of moisture from the under current of water, kills our wheat; and when we have a whole field of wheat killed by mildew, it is always killed at a time when we have excessively hot nights. The same is true of the gooseberry. We think the cause of mildew is this hot air and the dampness of the earth not having sufficient room to evaporate from the fact that the bushes are so near the ground.

Mr. Reid: Yes, but our gooseberry mildew comes in a time of drouth.

Mr. Hawley: If I may answer Mr. Hanson's question, I would advise setting currants, because I have currants to sell, and no raspberries!

Mr. Hanson: This is the situation with me: I planted a young plum orchard last year; set the trees sixteen feet apart, and there were about four acres in the lot. About half of this is low, damp, sandy loam. Now, I presume if I plant anything it must be of the bush variety, and of course I would like to know which would pay better, to plant raspberries, or gooseberries and currants.

Mr. Brillhart: I would plant it to raspberries, and I would choose Marlboro. Cuthbert would make a too rank growth and be too tender, but Marlboro needs lots of moisture and good, rich soil, and it will bear beautiful berries. It is a great seller.

Q. How about its yielding? A. It will yield more quarts of berries than any variety known.

Q. How about the hot seasons? A. It will stand anything.

Q. How about crumpling? A. It will stand up with anything, on my soil. On my soil Marlboro does not make the growth within half of what Cuthbert does, but I can pick more quarts of berries than off the Cuthberts. This will be the ninth summer, for my bushes, and they look as well as ever.

Q. Do they break to pieces when you pick or ship? A. No, sir, they don't; and you can slip them on the end of your finger.

Mr. Morrill: I have had some experience with Marlboro. When they first came out I invested \$750 in them, and I got the money back from them; but in three years the foliage fell and the crop failed. I repeated my attempt two or three times, and finally had to give it up, but I never had anything sell in Chicago as they did. For two years my price held at \$2.75 and \$3 per twelve-quart case, while other varieties went at seventy-five cents and a dollar. They were overhauled and sorted and carefully put in, and every berry in its place. It cost me fifteen cents per case to do that, but they brought a wonderful price. There was nothing else on the market, and I don't know where I would go to make money any faster than to cultivate Marlboro, where it can be grown successfully; but even when they failed at three years, I made money on them. On the Hudson river they have done well and at Saginaw, I have heard, they have done well; and even north of here.

Judge Russell: I have similar soil to that which has been mentioned, and I am planting black-caps, the Conrath variety; but I am only doing that because it comes in advance of Gregg, of which there are too many. I don't like to be where the crowd is too thick, in fruit matters.

Mr. Rork: Have you Kansas? A. Yes.

Q. Which do you like best? A. Kansas is the stronger grower, but it does not yield so well. It is just as nice a berry, and a little better grower, but it does not yield, with me, over sixty per cent. of Conrath. The question of anthracnose is a serious one with black-caps. Conrath so far has been free, though with me neither has had this disease.

Q. You say Kansas is the more vigorous grower? The other is good? A. Excellent. With me it is an ideal black-cap.

Q. Which stands drouth best? A. They both had to stand much of it last summer, and they came through in fine shape. Kansas has been best in this section.

Q. Better than Conrath? A. I think so.

Mr. Morrill: Kansas is a grand, good berry, but Conrath with me is a better one.

Q. What is your soil? A. Rich, black, sandy loam, very nice; and my present plantation is on quite new land. I have eight acres, set last spring on the older land, and they came along finely and showed vigor in spite of drouth.

Q. Do you advise setting the black-caps? A. No, sir, I wouldn't advise anything. I can simply tell you what I am doing. It is a bad plan to advise. Among red raspberries, I am favorably impressed with the new Loudon; it made a wonderful showing with me. I see the N. Y. experiment station says it must have a rich, moist soil—that is, Loudon. When it is at home, on the grounds of Mr. Loudon, at Janesville, Wis., it is on a rich ridge, which is underlaid with gravel and very dry.

Mr. Gebhart: I have plants of Kansas and Conrath growing side by side, one year old, and Kansas is considerably the better grower, though I have a neighbor who says he has fruited Conrath and he does not think it much superior. I don't see how Conrath can have any larger berries or produce any more in a given piece of ground than Kansas has done in this country. I have had 1,500 quarts to the acre, on one-year plants.

Mr. Morrill: I think my year-old plants of Conrath exceeded that. I had a thousand plants, and they netted \$110 in Chicago.

GROWING THE RASPBERRY.

BY MR. C. J. CONRATH OF ANN ARBOR.

Perhaps, to you large and prosperous peach-growers of Oceana county, the raspberry seems insignificant. However, some of you may be interested and others may begin to think.

It seems that to some the raspberry is closely related to the hazel bush or to milk-weed, and, not thriving under similar conditions where the hazel or milk-weed would, is discarded as unprofitable. Can anything be sadder, when the poor bush was so willing to respond to even limited cultivation? The thought that the bushes can not realize pain, or know their friends (contrary to Mr. Kellogg) is really a blessing. Imagine the suffering and the endless hungering throughout the fields of the country, were they conscious! Imagine yourself rooted to the ground in speechless terror, with enemies sapping the very life-blood from your system, and your whole being parched and dry. It is well, I say, that they know it not.

It is very gratifying, however, that others have made a success of raspberry culture. Around the larger cities, especially, has this class of fruit been remunerative. My own trials and experiences have been very satisfactory. Unless circumstances and locality are favorable (and I mean by this the market and help in harvesting the fruit) I should not advise planting a large acreage. Many mistakes are made in this line, and men become discouraged by failures.

From eight to fifteen acres of small fruits, well selected, makes about as much of a plantation as one man needs, and can handle successfully. I speak here of growers living near small towns. Near larger cities the acreage may be increased accordingly.

In regard to land, any good corn land will produce good crops of raspberries with proper care. I prefer a field that has been cropped the

previous season with corn, potatoes, or any cultivated crop. Thorough plowing, harrowing, and rolling just before planting are essential—the more thorough the better. We mark with a four-foot marker, one way, and with a one-horse plow make a single furrow in every second mark. Then, with a three-foot marker, cross the field. We then plow lengthwise again, throwing the soil the other way, thus making a dead-furrow to plant in. This method gives us a chance to cultivate the first year both ways. Early potatoes and string beans can be grown between rows the first season. By planting them closely one way, the bushes help support each other, and the fruit is less likely to become gritty.

When the canes grow to fifteen inches the first season, we pinch them back. The laterals now make their appearance, and when these touch the ground, which is in August, they are covered with soil for new plants.

The second year, when the canes are two feet high we pinch them back, meanwhile thoroughly cultivating with a Planet jr. As soon as the fruit season is over, we hasten the removal of old wood, and, burning the same, one more good cultivation and that work is done.

In cutting back the fruiting wood in the spring, we trim according to variety, size, and strength of the canes. If the laterals grow down to touch the ground, cut back from twelve to eighteen inches. If they make a poor growth, cut back from one third to one half. If more than four canes grow on one stool, take them out to that number.

The foregoing relates to black-caps.

For red varieties, I should use the same method of cultivation but would not advise heading back the young canes. The wood of raspberries requires thorough ripening to withstand the cold winters. I consider Gregg somewhat tender on that account. Some seasons its wood does not ripen. Cuthberts, and all the red varieties, with us, fail to ripen the laterals, and consequently suffer from severe cold. A year ago a hail storm accompanied by strong wind visited our section the latter part of May. The raspberry canes were then from two to three feet in height. Both red and black varieties were cut and bruised. Black-caps sent out their branches, and last summer produced a good crop, considering the drought, but reds were almost a total failure. The canes were nearly all winter-killed, especially those which sent out laterals.

In selecting varieties among the blacks, Conrath, with us, has surpassed all other early sorts, and Gregg for late. Palmer is good, but the last pickings are small. Kansas is a large berry, but the plant is tender. Sonhegan and Tyler make good promises, but fail after two or three gatherings. Ohio is productive, but lacks both color and size.

For red varieties, Marlboro on good, rich soil, takes the lead for early, and Cuthbert for main crop. Hansel and Crimson Beauty lack vigor.

In harvesting the fruit, two pickers take a row. We use the basket box. Each person is provided with a strong cord which is attached to a box called the string-box. On the bottom of this box are bunched from five to ten others. When one is filled it is taken by a man provided with tickets, who pays for each quart as he gathers them up. One man takes charge of ten rows and carries two twelve-quart trays. When these are full they are carried to the end of the row, placed in bushel crates, and taken to the packing sheds. Here each quart is looked over, and sticks, leaves, and berries with the stems clinging to them are removed.

Occasionally a handful of leaves or a lump of earth or a piece of wood to help fill up the box, is found. The offender, if caught, is at once sent home; and seldom more than one has to leave.

For the fruit sold to retailers and that which is shipped away, we place a card in the bottom of the box, printed side down. When the contents of the box are emptied, the card is brought to view, printed side up. It tells the lady of the house the name of the variety, invites her to try the fruit and, if suited, call again. We have found this a very effectual way of advertising our fruit.

The question now comes, does it pay? If properly carried on, I say raspberry-growing does pay. But I should not depend upon the fruit alone. Those little tips, trailing along on the ground, might be covered and form plants. A dollar received for plants is worth as much as a dollar received for fruit. You say you can not sell them. Not unless you make the effort; but it also requires an effort to sell the fruit. Both combined assure success.

Let me quote a few figures from a trifle over three acres of Conrath. It was what we called the oat hill. In 1891 we grew a crop of oats on the field and threshed 67 bushels, valued at 30 cents, and five loads of straw brought about \$35. The next year we raised 300 bushels of potatoes from the same place. They sold for 60 cents per bushel, or \$180. Pretty good! Last year we dug 42,000 plants from the oat hill. We received, wholesale price, \$15 per thousand, or \$630. We picked 275 bushels of berries, which netted \$2.40, after the pickers were paid—\$660, or \$430 per acre. I do not wish to give these figures as a basis to work on. We received an advanced price for our plants, being a novelty; but \$6 is a low price for plants. The berries at \$2 per bushel would leave \$275 per acre.

To sum all, I would say: Limit the size of your patch; select the best varieties; give thorough cultivation; make an object of the propagation of the plants, and place the fruit on the market in good condition, and you will find the culture of raspberries pleasant and very profitable.

DISCUSSION.

Mr. Farnham: At what time should the cultivation begin, and when should it end?

Mr. Conrath: We begin early in spring, as early as the ground can be worked. Last year our success depended on thorough cultivation. On twenty-one acres I had one man spend all his time with a horse and cultivator. When he was through with one end he started in again. We had but one little shower in April, and there was no time but we could remove the loose soil and underneath it was moist. Others, in the next field from us, lost their berries by drouth. They literally dried on the bushes, and in one case a plantation got afire, and unless there had been help the whole plantation would have burned. So we keep on cultivating, from the time we get into the patch until the fruit is ripe.

Prof. Slayton: Was that deep or shallow planting? A. Ours have been mostly black-caps, and we plant deeply.

Prof. Slayton: Are you troubled any with yellow rust, on the leaf? A. I have found in some cases single plants affected, and when we have anything of that description, we remove the entire plant and burn it up.

Q. Do you use a plow at all? A. No, we find that that ridges up the soil, and leaves it uneven. If properly cultivated with the Planet jr., or Ajax, or any improved cultivator, you can keep the soil in proper condition, and it is always level.

Mr. McClatchie: Have you tried planting in squares instead of rows? If so, why do you prefer rows? A. We can get more fruit from rows (matted rows); and another thing one cane helps support another. It requires a little more work. We usually go over the whole thing the first year and remove all the weeds that we can not get with the cultivator. After that the bushes shade the ground so that the weeds never grow very high, nor the grass either. When grass appears, the timothy or clover, we go over it.

Q. What fertilizer do you use? A. Common barnyard manure I have found is the best.

Mr. McClatchie: Do you recommend that the red raspberry be raised in matted rows? A. Yes, sir.

Prof. Slayton: Do you shorten back the canes as they grow during the summer? A. As soon as the cane, in the black-cap bed, is a foot high, we pinch it off.

Q. How about the red? A. I should leave the red alone. In the little paper I had, I referred to a hail storm the last week in May. The berries were set and in blossom. The suckers on the leaders were out, probably, from two to three feet, and there was a heavy northeast wind which swept down under the rows and cut many of these off on the north side. These bushes naturally sent out their laterals, and those were the ones that froze, and last summer they were almost a failure.

Prof. Slayton: At our Adrian meeting some one advocated no summer pinching.

Mr. Conrath: That applies to what I have just said in regard to reds, I would leave them alone; but the black, pinch back by all means.

Q. At what time do you remove the old wood? A. As soon as the fruit is off, and we burn at once. That has been our method, and we have kept exceedingly free from disease. Prof. Taft visited us, and said, "You have done well."

Q. What do you find the most convenient way for removing the old wood? A. We have a hook made from old files. They are heated and bent. It is hard metal. The hook is like a small crescent, about two inches on the outside and about an inch on the inside. We keep it sharp.

Q. This is attached to a handle? A. Yes, sir, so that a man standing can remove the wood. The handle is $3\frac{1}{2}$ feet long. It is less tiresome and does the work as well.

Q. Where the black-caps have not been pinched back at all, they have long limbs. Would you cut those back? A. Yes, sir.

Q. How much? A. We are a little more severe on our one-year-olds than the two-year-olds, and of course we make it a plan to pinch them off from the beginning. A plant pinched off would be in different condition from one not pinched off, and on our plants that are pinched we cut the laterals back to six or eight inches, and if a cane has grown out and

trailed along the ground I should cut it back to twelve or fifteen inches the first year. I should cut the laterals back to six or eight inches.

Mr. McClatchie: We have found shears with handles three feet long better than the hooks. We have discarded the hooks; the shears cut easier.

CROSS-FERTILIZATION.

BY MR. ELMER D. SMITH OF ADRIAN.

Producing new varieties of fruit and flower, by artificial cross-fertilization, is very interesting, as well as profitable when improvements are gained and the general public are gratified in these gifts of nature's most precious gems. Knowing you are deeply interested in the various kinds of fruit, and having had no experience in this direction myself, I feel entirely out of place in presenting a paper on this subject. How much has been or is being done in improving the several species, I am unable to say, but there are several gentlemen present who have kept in touch with progress along these lines that will gladly inform you. Twenty years ago it was believed impossible to secure seed from the chrysanthemum any other way than by nature's own method. See, to-day, how many fine seedlings are being produced by the union of the most desirable, through artificial fertilization. How susceptible fruits are to improvements I can not say, but from the new varieties offered each year it is evident they are not incapable.

The advantage of hand pollinating is, the operator determines the parents of the seedlings, while in those from naturally produced seed we know the quality of the seed-bearing plant only. The staminate parent may be good, bad, or indifferent. It is at least rational to conclude that greater achievements will result from seedlings of selected parentage than from those the wind and insects have haphazardly united. In this work we are confronted by some arbitrary laws of nature over which we have no control, and which, like many of her doings, are mysterious. There is a very marked tendency to revert to the original; or, in other words, to partake of antecedents, and sometimes of those very remote. In crossing two white carnations we would expect the progeny to produce white flowers, which some may do, although there will almost invariably be pink and red among them.

It is important that the work of pollination be carefully done to secure without doubt a cross between the two desired varieties. The pistil and stamens are the organs of the flower with which we must become familiar, as well as control to prevent self-fertilization. In the apple, pear, peach, and cherry, the center organ is the pistil, which is encircled by the stamens. The tips of these, or anthers as they are called, supply the pollen. Like the rose, most of the fruits produce pollen in a few hours after the flower is open, when it is in the proper condition to be used. By observation it will be easy to determine which flowers will open on a certain day, and these are the ones to be prepared.

When it is decided which variety shall be the pistillate or seed parent, select a cluster of buds and remove the petals (the colored

leaves of the flower) so as to expose the pistil and stamens, and at the same time remove the stamens. This is easily done with either scissors or small tweezers, and early in the morning is the best time, before the stamens give off pollen, the object being to prevent self-fertilization; and to further guard against such a course, the pistil should be covered so that the dust-like pollen can not be brought into contact with it by the wind or insects. For this purpose use light muslin or cheese-cloth, of convenient size to cover the cluster nicely, and keep in position with a pin. When we have proceeded thus far we have the unfertilized pistil, which will soon be ready to receive pollen, and so must decide what varieties shall be the staminate parents. The flowers that open on a bright morning will by ten o'clock be abundant with pollen. This is easily collected on a camel's-hair pencil. The flower previously prepared may then be uncovered and the pollen applied to the upper surface of the pistil, or stigma, as is termed. Cover the flower again for a day or two, and the work is completed. A whole cluster of flowers may be thus worked by repeating the operation from day to day as they reach the proper stage of development.

In plants for florists' use it is important that they have a good, vigorous constitution, and to impart this to the seedling the more robust varieties are selected for pistillate parent. I have no doubt that hardiness and vigor are desirable qualifications in all kinds of fruit and so I advise such to be used for bearing the seed, and depend upon the pollen-furnishing variety for productiveness and quality. A complete record of the work may be kept by using an ordinary tree label, numbering each operation, and at the same time entering in a book a corresponding number with the record, thus: No. 1, Early Crawford X Early Michigan; No. 2, Early Crawford X Barnards. In all cases the seed parent is first mentioned. Do not fail to keep a record of your work. It will be very gratifying to know just how a choice seedling was produced, and very likely will suggest to you a way whereby other desirable improvements may be made. When the fruit is ripe, the seeds should be saved, carefully numbered, and placed away for safe keeping until planting. Like all work of this kind, it is only by persistent effort that good can be accomplished. It seems to me that there are great possibilities in store for some one who will take up the work, and I can see no reason why his labors will not be fully rewarded.

DISCUSSION.

Prof. Slayton: It is just as easy to cross different varieties of fruit or flower as it is different varieties of cattle or sheep. The process is a similar one, only, in the blossoms, in perfect blossoms, we find the two organs in the same flower. The paper has described that part thoroughly. You understand, of course, after this blossom has been treated as the paper describes, the seed must be used, and the product of that seed will be the hybrid. That is what will show the effects of the crossing. In fruits you can not take a tree and cross it, and expect that the fruit on that tree will be affected. But you plant the seed that is in the fruit, and raise the tree, and in five or six years you will have a fruit that will show the effects of the cross.

Mr. Brassington: Do you advise the intermixture of different varieties of tree in the orchard?

Prof. Slayton: I certainly do. We have found recently that very few blossoms are fertilized from the other organs in the same blossom. But when you think of the size of the grain of the pollen, the millionth part of an inch, and what possibility it has of reaching the adjoining flowers, it is remarkable. For instance, among the grapes, some one might ask how far apart the different varieties of grape should be planted, in order that they may be fertilized. Suppose they are eight feet apart. A particle of this pollen must pass over those eight feet. How many grains of pollen are there in a single blossom? Here is a circle sixteen feet in diameter. How many grains of pollen will it take to completely cover that circle so that a single one of those grains will strike that flower. The chances for the wind to carry it are about one in a million. Who, then, or what, does it? Probably the insects in ninety-nine cases out of a hundred, with grapes planted that distance apart. I suppose no one intended to say that the blossoms should be planted in juxtaposition. We must depend upon the insects. While we were speaking this forenoon, my mind ran back to our apple and other crops. What is the matter with our insects? We have been trying for some years past to kill all the insects by spraying our trees with various mixtures and poisons, and our apples have failed, as well as many of the other fruits.

Mr. Morrill: I don't think there is any spraying done when fruit is in blossom, is there, and the blossom-working insects are the only ones that do this business. Does any one spray in a manner to kill this class of insects?

Mr. Rork: Every species of plant has a kind of abhorrence of self-fertilization, so it is best to plant varieties near each other, even though they are pollen-bearing varieties. I think the wind can do a good deal. Mr. Husted, the originator of Michigan Early, and I suppose of Triumph, the new freestone peach, told me that he brought it to pass by inter-fertilization. He said he was careful to cover the limbs with thin cloths, and then, by inter-fertilization of the sort he wanted, he secured Early Michigan, and in Georgia he secured Triumph.

Mr. Reid: As regards alternating varieties, I recall hearing Prof. Bailey describe the orchards of Mr. Willard and Mr. Hammond at Geneva, N. Y. He said that there was no order to them whatsoever; that the varieties were all mixed up; scarcely a row of a variety; pears and plums and apples are all mixed, all over the grounds; and he said that, whereas many other orchards were not bearing at all well, this one was a mass of fruitfulness. It does not seem, in the light of such evidence as this, that there can be any doubt as to the wisdom of planting varieties in alternate rows, or even in closer proximity. Our president has done a little work of this kind, and I know of no better way to get light on it than to have him relate how he created the Osage muskmelon.

Mr. Morrill: I don't know as that would be of so much importance. I will say a little in this line, and then, if you want me to say anything about that, I will. It is a well-established fact, that nature abhors inbreeding. Man, by the conditions under which he places his subject plants or animals, may enforce it, and the product will unquestionably

be weakened. In the fruit, it is in the seed; that is not the part we market, but without perfect seedlings there can never be perfect fruit, and our best growers today are convinced that, even with the varieties that are self-fertile, they secure better results by having the presence of some other plants of the same species near by, so that the intermingling of pollen may take place, giving a stronger seed and thereby securing a stronger and better fruit. The blossoms on a whole tree are practically one blossom; they are alike; the stamens on one are just as useful to the pistils of that blossom as the stamens of another, and no more; but some other variety, adjoining, may be very valuable to that blossom; and, as I say, they prefer cross-fertilization with another variety. At least, it produces better results. We understand that, all of us who have had anything to do with animal breeding and it applies just the same to the plants and fruits. Mr. Kellogg exploited the idea at Grand Rapids, that a tree knew its friends; had sensibilities. That is a pretty theory, but, literally speaking, it is impossible. But it is a good idea to get into your head, because trees and plants do respond to your care, commencing with the day you plant; and if you have these idealistic notions there is no question but your results will be better. Pollenization is a matter that people are coming to be very much interested in, because it is so little understood, and the possibilities seem to be so great. There is no question but excessive pollenization is weakening. Mr. Reid spoke of the Osage muskmelon, which I worked on myself. It was before I knew half so much as I have learned since, and the work was done in a crude manner; it was simply by planting two varieties together, and allowing the insects to do the pollenization, and making a selection from what resulted, and following up that selection. Finally, when it did not please me, I went all through that process again, with this cross-breeding. That is the difference between cross-breeding and hybridization. The mule is a hybrid, but the Percheron and a trotting horse may be cross-bred. This was a matter of simply cross-breeding, with already well-established varieties. The first melon used was known as Miller's Cream. I don't know how that was secured. Then there was a little yellow-flesh melon that was brought from the Osage river section, in southwestern Missouri, found in the hands of a Swedish gardener there, by a neighbor of mine; he kept some of the seeds because it was delicious, and brought it back with him. The Orange Christiana was the third melon used. We began with Orange Christiana and Miller's Cream. Selection goes a good way in building up anything, just about as far as cross-fertilization. You know what you can do with any vegetable by selection; but that leads us off to another field that would occupy us a day, and every minute be valuable.

Mr. Brassington: Have you discovered that some varieties are weaker in pollenization than others?

Mr. Morrill: Peaches are the best able to take care of themselves of anything I know of.

Mr. Tower: What about the Wild Goose plum? How do you fertilize it?

Mr. Morrill: Give it up. I don't think it is worth fertilizing any way. It can be, but the only way is to select any plum that blossoms and casts

its pollen at the time when the Wild Goose blossom is ready to receive it. I would name, as one variety, Miner; but after you have experimented you would better save one tree, to get a little fun out of it, and plant something else for market.

MICHIGAN PLUM CULTURE.

BY MR. JAMES M. HAIGHT OF HART.

Mr. Haight prefaced his paper by saying: "I wish to say that I come before you with diffidence. I am well aware that many men here have been growing plums longer than I, and are abundantly able to teach me. I want to say a word about the capabilities of Oceana county for growing plums, though almost every one knows it. Mr. Willard of Geneva made a statement at Shelby, that he had traveled over the Pacific coast, from one end to the other, and observed all their fruit there, and seen it under all conditions, and that he never saw finer prunes than Oceana county produces; and he said, 'If I were a young man again, I should immediately go to Oceana county and go into the business.' This is a good deal, coming from such a man as Mr. Willard. We have been growing plums about ten years only. We have about 2,000 trees, four or five hundred of them in the prime of life. We have twenty-six or twenty-eight varieties only. There are very many of the older varieties; the new ones we have not, to any great extent, and there are some I think we do not want."

Were I to begin at the foundation of plum-growing, I would look well to the soil. It is true that Lombard will do well on sand, but even that variety will do better on heavier land. I consider a rather heavy clay loam the best.

The next matter to look after is to determine what the varieties shall be. Having settled this question, we naturally wish to find a nurseryman who will deal honestly with us. But the best way is either to grow your own trees or buy from a nursery near at home, of a man you are acquainted with, and where you can see the trees before they are dug. Honest men are in the nursery business in nearly all parts of our country, and I am sorry to say dishonest ones are, too, and it is almost useless to expect straight goods from the best of them; for, when their stock is exhausted, they buy of other dealers to fill their orders. So you know nothing of where your trees come from.

I bought three or four hundred trees last spring of Hammond & Willard. They pride themselves on having black-knot conquered, but I have cut quite a number of knots from those trees. Therefore, I say, grow your own trees. Then you will be sure you have the varieties desired.

I advise budding on peach stock, if the land be dry on which you intend to plant your trees. It is true that some kinds of plum can not be made to grow on peach, will not unite; or, if they do, will soon die. This has been said to be the case with Damsons, but by grafting it can be done, as I have Damson trees so grafted.

I would not plow a plum orchard after the fifth year from setting. The soil then is full of roots, and the mutilation of roots by the plow would be too great. The cultivator, or even a spring-tooth harrow, is to be preferred. A great deal is said lately of Breed's weeder. I have never seen one, but certainly if its value as a cultivator is equal to its price it must be valuable indeed. Do not set poor trees. Money invested in such is worse than wasted.

Perhaps no fruit grown in Michigan needs better soil or more fertilizing than the plum.

I do not pick any plums until they are ripe and fit for use.

To destroy the curculio I jar the trees, catching the insects on a sheet, and of course killing them. It is advisable to burn, or in some other way destroy, all fallen plums, thereby lessening the next generation of curculio, though the better and more often cultivation is given the orchard, the less curculio will there be.

It is said, do not use strawy or green barnyard manure. I say, use all kinds; do not think wood ashes are as valuable as they have been represented to be, though certainly worth applying.

I have sprayed for shot-hole fungus with good effect. I have not made thorough work of spraying, though, as far as I have gone, I have seen no advantage in spraying for curculio. Men differ in regard to this, many declaring it will certainly kill or keep off the pest.

In plums as in all other fruit, the larger and finer they appear, the better they sell. I would advise planting varieties that ripen in succession, from earliest to latest. Bradshaw is the earliest we have in bearing, and I think, of all plums on earth, Bradshaw is liked best by the curculio. But after all the anathemas against curculio, I do not think them an unmitigated curse, though they often destroy a crop of plums. Yet I have known them to save the crop where the trees were overloaded, the curculio being allowed to sting them at will. The fruit was thinned thereby.

It is well known that if the plums hang in clusters, so as to touch each other, they will be small and lack color as well as flavor. They are also much more likely to rot, as this disease is communicable.

I have watched the use of Bordeaux mixture by plum-growers, for the rot, but have never observed any good results.

In gathering from the tree we pick with a knife, cutting the plum from the twig, never pulling them off, though this is only practiced with the large varieties. As to packing, if you expect to hold your grip on the market, and have anything in your pocket-book, be honest. If you care nothing about your own reputation or that of your neighbors, put the culls at the bottom and fine fruit on the top, and the result will be certain.

BY MR. S. D. WILLARD OF GENEVA, N. Y.

Mr. Morrill: We have a letter from Mr. Willard which touches on plums.

Mr. Reid: Reminding Mr. Willard that this meeting was to be held in Oceana county, for which he seems to have unbounded admiration, I

wrote to him, saying that we would like to have a letter from him concerning plum culture. His answer came in due course, and is as follows:

GENEVA, N. Y., Feb. 17, 1896.

My Dear Mr. Reid: The mercury from 16 degrees to 20 degrees below zero for the second time within six weeks, means that the peach crop of western New York, for 1896, is a used-up community. I hope the people of the Michigan lake shore are not in the same position.

I have just received an invitation to give a talk before a farmers' club in Onondaga county, where they wish to discuss the fruit interests instead of grain and potatoes. Week before last I spent an evening on fruit topics with the agriculture class at Cornell university, of about 100 in number, and you can imagine those bright, active minds were loaded with all imaginable practical questions on this subject that could be thought of. Among others, where is the best place to grow plums, Mr. Willard? "The east shore of lake Michigan would be my choice, young men, if at your age I could start anew, with my little experience and opportunities for observation."

What would you grow? "Well, my advice has ever been to not confine one's efforts to one single variety. As a rule, I regard it as an unsafe principle to bank on, and yet I should start off with the largest orchard of prunes to be found on the Atlantic slope, with the firm conviction that in this there would be no mistake. The growing cities across the lake will consume to the growers' profit all the prunes that will be grown for a half century to come." And thus I elaborated, setting forth the advantages of soil, climate, and surroundings, until you would have thought I had some special interest in your state and was "to the manner born."

And now, how I wish I could attend your coming meeting in Oceana county! I feel when meeting with your people that I am with my friends, and enjoy every moment, and then add so much to my stock of valuable information that it is just a grand investment.

Inasmuch as I can not be with you, and there are so many with whom I feel so thoroughly acquainted in that most excellent plum region, I am inclined to give you a few notes from my big memorandum book that I frequently refer to when preparing for the next season's work.

Well, while looking ahead to the end of my life work, as a sensible man should, I yet can not stop; hence, in the latter part of December, of my life's calendar, I shall put out a thousand more plum trees, all Lombards—not to be fruited as Lombards, but to be top-worked over to such sorts as I believe will be wanted in the future and may be grown with more profit than others.

Every year confirms me in an opinion long held, that the profits in fruitgrowing are greatest in growing those varieties that the masses do not grow. Hence I shall continue to work on this line, which I regard as the wise thing for me, while at the same time acting up to my convictions.

Some years ago, when spending a few days at Hart and seeing the acres of promising orchards that had been planted, I said to some of my friends, "Too many Lombards; some one will be sick, one of these days." Perhaps the time has not yet come, but it surely will, sooner or later. Hence, I say again, as I have often said, plant the very early and very late sorts, and allow some other fellow to make his ventures on the mid-season sorts that come in when there is a glut of every sort of fruit on the market, from every point of the compass.

With us Lombard is cheaply produced, and yet, as a rule, it sells at the lowest price, and oftentimes so low as to leave no margin for profit. Again, every one planting an orchard is inclined to plant plums, and also to plant this sort; hence the danger, sooner or later, of an over-production of one kind. Is not this pretty much the situation today in Oceana county? As a rule, the demand is greatest, in all markets, for dark-colored plums; and so I would advocate such sorts most largely. But the region where the prune is, or will be, grown, this side of the Rockies, is pretty largely confined to a limited section in New York and the shore of lake Michigan; and, being rather slow in coming into bearing, the masses will be slow to adopt it as their favorite.

So far as my observation has extended, it has never been sold at anything short of good paying prices, while there is an increasing demand for the fruit

every year. It may be grown with success upon the peach or plum. It is a hardy tree, and, all else being equal, may be depended upon for a crop in alternate years, and possibly with a light crop the off year. The fruit is of greatest excellence, both for eating from the hand and preserving, and has no equal for keeping in fine condition for long-distance shipments. So much for the prune.

Some one inquires, "What other good sorts, or most valuable, for the commercial orchard?" My response is, "Few early are wanted, and among them my favorite is Field, a seedling of Bradshaw, of about same size, a little darker in color and ripening ten days earlier. A commercial plum orchard is hardly complete without a few Damsons, that are generally wanted in the city markets. Hence I would add in the list some Shropshire, French, and Blue Damsons. The Reine Claude de Bavay, while a little tender as a tree, is a great producer of excellent fruit, and being classed in the list of late plums is unexcelled as a light-colored fruit, and finds a ready market at paying prices. It is my choice outside of the dark-colored sorts. Black Diamond is a gem indeed. It ripens just a little after Lombard, and when better known will be sought after. While Grand Duke, Archduke, and Monarch, all large-size sorts, should be found in the coming orchard, French Copper, an exceedingly poor grower, of medium size, is unexcelled as a producer, and comes so late, with no tendency to decay, that it is one of the best paying sorts in the list. The difficulty is that, in its growing habit, it is so rough that no nurseryman will grow it at a price planters are willing to pay.

The Japanese varieties have paid me well, especially Burbank, which so far I regard as much the best.

Lombard possesses advantages that make it the most desirable of all, as a variety on which to work sorts having bad habits of growth. So I often plant it for this purpose only. From a quarter century's experience with a multitude of varieties, I see no reason for discouragement to the intelligent plum-grower; but, with the prosperity which is bound to dawn upon the country sooner or later (and sooner than many anticipate), I fully believe there is a fortune within the reach of those men who put in the plantings of the right sorts in the right place.

It is quite possible that my choice of varieties may not be the wisest selection for your lake shore, but they certainly are most desirable for my location, and some of them I am thoroughly assured will do equally well with you.

As usual, I am hurried with my work, otherwise I would be glad to add a few words as to feeding, pruning, and other points of importance in connection with the work.

Your friend,
S. D. WILLARD.

DISCUSSION.

Mr. Haight: Has any one noticed a spot of some kind on the plums, these latter years? Perhaps it does not date back more than three or four years; it is a blue spot about the size of your finger nail, and it appears on Damsons and one or two other varieties. It is something new, and I have been unable to have it explained.

Mr. Morrill: Is it a disease?

A. I think so.

Q. Is it materially damaging the fruit? A. After the plum is grown there is a hard lump.

Mr. Hawley: In regard to that blue spot, I believe he refers to a condition of the fruit which I have noticed. I sent some of the plums to the department at Washington, and the reply was very unsatisfactory, saying it was caused by the puncture of some insect, which had been grown over. However, we have noticed it on the German prune, and nearly every fruit, when it arrives at a certain stage, will have these spots under the skin; and if I am not mistaken, it is at times mixed with gum.

Mr. Haight: It is, that is right.

Mr. Hawley: And yet they took it there and pretended to investigate it, and their report was very unsatisfactory, so I presume the nature of the disease was very little known.

Mr. Morrill: Has any one put it under microscopic examination?

A. We pared the skin away and found black specks, streaks, running in different directions. It is possible that they were right in Washington, but what insect it was they did not state.

Mr. Haight: It has been suggested that it was caused by a defective pit.

Mr. Morrill. What causes the imperfect pit? Imperfect pollination?

A. I don't know about that. But that could not be the cause, because many of the pits were all right.

Mr. Gurney: I have had the matter under consideration. I have noticed these spots on the Lombard plum and others. The curculio has a bad name, and I do not know any other enemy that it would be better to charge it to. I think the curculio, the second brood, will sting the plum in August, and not every egg hatches that is deposited, and I think the trouble is caused in that way. They tear a hole in the plum, deposit an egg, and it does not hatch, and there is a blemish on the plum; and many of these cuts are about the shape of their work. We did not know what else to lay it to, except the curculio, and I am inclined to think that that is what it is.

Mr. Haight: Inasmuch as the curculio has been in the country a long time, and these were only found recently, it does not seem just reasonable. They usually rise slightly above the surrounding surface of the plum, and it dries and there is gum.

Mr. McClatchie: It is a well-settled fact at our experiment station that the curculio, the second lot, does not lay eggs, and if that be the case it is not the curculio which causes the difficulty. I confess, I don't know the cause; I would be glad to know what it is. We have noticed the same thing and know no remedy, nor yet the cause.

Mr. S. Wanmer: There is a good deal laid to the curculio, but we can not lay this to him. I notice on my prunes, before they crack open, a dark spot; in the dark varieties it is very dark, and in peeling it down I have noticed that it comes sometimes from the pit; sometimes it does not reach clear to the pit, but it is a good deal like dry rot of the potato, and for a couple of weeks before they burst open you will notice this dark spot, so I am satisfied that it is not the work of the curculio at all, but some disease. Some years nearly all my prunes have been that way, and I killed the curculio thoroughly; before I get them sorted this gum rubs off, and it is not noticed on the fruit at all, with some exceptions, and they are all right when you can them.

Mr. Morrill: Your inference would be that it is a fungous trouble of some character?

A. I think so.

Mr. Haight: I sprayed for this, but it had no effect. The plums do not drop, do not seem to be injured at all, excepting that little hard spot, and it is an eye-sore in the preserved fruit.

Q. Do they show up badly after they are picked? A. In the green plums it does show, but not in the blue plums.

Q. It is present in the blue plums? A. In the prunes.

Q. How about Lombard and Bradshaw? A. I have seen it in Lombard but not in Bradshaw.

Mr. Hale: Did you spray for that?

Mr. Haight: Yes, before they leaved out at all, and until that spot appeared.

Mr. Barry: How long has this been known here? Is it more than two years?

Mr. Haight: I couldn't say just exactly when I first saw it, but certainly I don't think it was further back than four years ago. Mr. Wanmer perhaps knows more about that than I.

Mr. Wanmer: I have noticed on a farm across the road from mine this same thing; the first time I noticed it, it was on some yellow variety. That was seven or eight years ago, and I worked the place for awhile and gathered the fruit; and, as I say, the gum rubs off. Of course, on the light-colored fruit it shows this mark quite plainly, but the fruit sold well.

Mr. Gebhart: I don't think the cause can be laid to the curculio. I have noticed it three years in my orchard. Two years ago, I had two acres of German prunes, and I don't think there was one in the whole lot that was not punctured. It was just enough to break the skin. I laid it to an insect that stung or bit the fruit. The German prune is most liable to injury. In the German prune, it begins before they commence to color. Generally a little gum comes out, and that rubs off. In the green plum you can see it. I don't know as it affects the dark-colored fruit for the market, but it certainly does the green plums.

Mr. Morrill: Then you are satisfied that it is the work of an insect?

A. Yes, I have seen it three years, and I am satisfied that it is insect work. Of course, as Mr. Gurney suggested, the curculio is the most mischievous of all, but we can not lay it to him. We have sprayed before and after, but it don't do any good.

Mr. Morrill: I would suggest that specimens of that puncture be sent to Prof. Davis, at our own college, and give him an opportunity to study the matter, and if it is of any consequence Mr. Davis would gladly come here and study it.

Mr. Rice: My attention has never been called to this, but as I think of it, I can remember that same little globule of gum on our plums, just as it is described; I can remember having seen it for years.

Mr. Morrill: I have been looking over the Report since you have been talking, and I see that Prof. Davis has not taken the matter up, and evidently his attention has not been called to it. The investigation might be valuable, and can be had without any expense.

Mr. Markham: I have been in the plum business a number of years, in a small way. I of course have made it a study, as much perhaps as any one. I have tried all varieties. I had Lombards, because everyone said they were the best. I say yet, that a careless man can raise Lombards; but when it comes to fine, large, nice plums, you have to work. I have Bradshaw, and in fact most of the varieties, and I grow my own trees, and have done so for a number of years. I see that Mr. Willard, in his letter, recommends planting Lombards, and then to top-graft with something else. I have a still better idea in my own mind that I am practicing considerably. Plant a peach tree and let it become three years

old, and you can put a top-graft of plum in very nicely. I do not recommend this for very old trees, because it does not work as well; the old tree does not grow as fast as the plum; but you take a thrifty peach tree, three years old, and you can grow a plum tree on that quicker than any other way I know. If I were not positive of it, couldn't show it to you, I would hardly believe it myself; but I am satisfied that if nothing occurs this year I will have an immense crop off of these very trees. Some would say, you have to fight borers; but if a man isn't willing to fight borers he would better go out of the business. The borers, so far as I am concerned, are not great bugbears, because I think I have them under such control that they don't bother me much. I am satisfied that you can get a plum tree that way quicker than any other. Occasionally I buy a tree, when I want different varieties. Another thing about this top-grafting. I know you should not try to put Lombards in. I know that Bradshaw succeeds well and Quackenboss is the best I have ever found.

Mr. Morrill: The Japan varieties will do it, too.

A. I never tried it, but I know they grow, budded in that way, and they are fine. So far as Mr. Haight's article is concerned, he is on the right track. I am not a sprayer for cureulio. Mr. Willard has been up here. I went with him one day all over this country, and he adopts the jarring method; in fact, I have one of the machines he uses, and I think every man who is going to jar should secure something of that kind. With this method you have them right in a box. In working around with the other methods, you step on the fallen plums and crowd them into the ground, and they are just in good condition to hatch out in four or five weeks. I have undertaken to pick or sweep them up, but with this new machine we get all that drop off and have them in a box, so that they can be destroyed. Of course, I think it is the only way to raise plums. With spraying, some will fail and some succeed, but I never heard of a man who jarred thoroughly and kept his ground clean, who would say that he had failed. As regards varieties, there is one thing about Bradshaw. We always look forward to getting a good price for them, but when they are ripe the market is somehow low. They are too early. My experience has been that the Gages have brought the best price. People inquire for Gages. I don't know why, except that we have always had Gages, and people think they must have them, and I don't believe we can grow too many of them. I pick my plums with a shears, because there are some varieties which you can not pull off, unless you pull out the stem, and that injures the fruit. So I use shears, and it is just as rapid and more satisfactory. That is, with larger varieties.

Mr. Morrill: What is your opinion or experience as regards thinning Lombard to make a good-size plum? If they are thoroughly thinned, won't they make large and salable plums?

A. Well, yes, they have been with me, but as a rule people don't let them become ripe. I have seen them picked when I wouldn't give a cent per bushel for them. A plum can hang until it is ripe, and it should; and I can say this, that I have never had any variety that was satisfactory but I wished I had more.

Q. Will you describe your method of catching cureulio, the contrivance you use? A. Well, it is something like an inverted umbrella. It is round, and of course, being in that shape, anything that falls into it goes right

to the center. You run it along beside the tree, and jar the tree. There is a box which holds nearly a bushel, which can be slipped out, and the insects destroyed. I like it very much, for it catches the plums as well as the bugs. Speaking of the little spot on the plum, I think it is the second brood of curculio which cause that. There is something that stings or bites it. We notice it more on white plums, but I never have noticed it so that I paid much attention to it.

Q. After you have gone through the operation of catching the curculio, are there not plums which drop? A. Certainly, and we catch the plums too.

Q. How long do you continue this operation? A. Well, you have to follow it up very closely for two or three weeks, and you should not miss a day. I have been asked that question a number of times. Every time you get a chance, go at it, if it is twice each day. With some varieties, it is almost impossible to catch any unless you jar often. I keep my trap set, and when I pass I give the tree a thump. Of course, with Lombards, you do not have to follow it up so closely, but with the larger varieties it is necessary.

Mr. McClatchie: I have a little to say about the curculio. I hear you say you must keep at it two or three weeks. Perhaps this is necessary in Oceana county. I follow it up only one day, and never failed to raise a crop of plums. I know just what I am saying; I have practiced it year after year. I don't want that whirligig umbrella. I simply want Mr. Willard's plan. Instead of two sheets I take one. His plan is to take two sheets, and have four men, besides one to jar the tree. He would take a quilting frame, put the sheet across, a man at each end and one either side of the tree, and they would walk along with the frames. They would never stop. The fifth one would have his mallet ready to strike the tree when they were under it, and the curculio will not fly off as long as you keep the sheets in motion. Early morning is a little the best time, and we work at it until six o'clock. I claim that if you jar a tree once every hour, all day, you get all the curculio there are on that tree, and I have practiced it, year after year, and have never failed to have a good crop. I do not use the two sheets, because I haven't a large enough orchard. We simply have a sheet nine feet square, and put a frame all around it, and two strips across to support it; and then we walk up to the tree, and when we are under it I strike it. The men never stop. I have two men carrying this frame, and I do the jarring myself. Just as soon as they are there, I strike the tree, and they back up enough to get clear of the tree, and then go to the next tree.

Q. How soon do you start?

Mr. McClatchie: That you must watch closely. I do not miss a day, at the time they commence. They commence on the first warm day after the plums are out of their jackets, and just as soon as I find that they have commenced, I take a warm day, such a day as bees would be active; and as I have only a couple of acres, we get around ten or fifteen times a day. At the first jarring I have counted 150 from a tree, and at the last jarring we would not get one.

Q. How many times, with your system, do you think it necessary to jar each tree? A. I jar it until I do not find any; that is usually about

half a dozen times; I think some fly away. I think, however, that the first time we get two thirds of the whole brood.

Mr. Rork: While it is in blossom the curculio is there, like the potato bug. He is there, and if you shake the tree you will thin them out before they have a chance to do anything. As to spraying, it seems to me that some one is not careful in observations about spraying. I both spray and shake. If you jar a good deal, you won't need to spray much, but the spraying is easier done, and it kills other things, insects and the like, and I consider one or two good sprayings will be beneficial. I can drive them from one row of trees to another with cold water, and I can drive them with spraying from one orchard to another.

Mr. Morrill: Mr. Markham did not go quite far enough in describing that trap. It is simply a labor saver; it is on wheels and has a trap under it. I have it and it is a very nice arrangement.

Mr. Lewis: We were taught years ago to catch the curculio soon after the foliage gets out; there was one method highly recommended, and called trapping. It was to place shingles under the tree. The theory was that at night they would seek shelter under the shingles, and the theory was borne out by the facts, for we would find them there, on taking the shingles up in the morning. That is before the trees have blossomed. Then, when we took up spraying, we were recommended to spray before the trees blossomed, and we killed a good many that way, because they fed on the foliage. Take it all in all, we have a good many theories, and the facts must be sifted out by observation. I find in jarring, however, that you won't find them very plentiful until the fruits are large enough for their needs, and then they will come in swarms; they come from somewhere. I recollect, years ago, jarring to catch them on early peaches. I had an orchard contiguous to a forest, and on the row nearest the forest I had more trouble than on all the rest. I had an idea that they came from the forest. They are all over the country, and when it comes time to deposit their eggs they are on the move for food, and I do not find many curculio until the conditions are right. Of course, you will find some, but they come in swarms when it is warm enough.

PHASES OF PEACH CULTURE,

DISCUSSION OF QUESTIONS.

How early would you plow?

Mr. Hale: I would plow differently from some, I would begin working early in the spring, and in that I am conflicting with Mr. Morrill.

Mr. Rork: It is surprising how quickly a little stirring of the soil will start anything. I think there is danger in stirring it too soon. There is one advantage in waiting—you can do it all at once; and if there are any weeds to come up, you destroy them in the plowing, and turn them under a little. If you wait too late, then you do not finish until after the drouth sets in and you have lost part of your moisture. I consider all of these things.

Mr. Hale: If you wait until after the 19th of May, to get rid of the frosts, I believe it is too late to save the moisture. After the ground is thoroughly settled, I would commence cultivation early; I have practiced it and found it beneficial.

Is there any difference between Lewis and Early Michigan; if so, what is it?

A Voice: Yes.

Mr. Morrill: In regard to that topic just gone by. Mr. Hale is located where I should think he would escape the frost if there is such a thing in the country. His orchard lies upon a high ridge, a most perfect place for early cultivation; and don't you think, Mr. Hale, that your deductions might not fit other cases? Don't you escape when other people catch it?

A. Yes, but not last winter.

Mr. Adams: I am really afraid that we will get the idea of cultivating too early in this country. I was given an illustration in my own orchard. Mine is located as Mr. Hale's is. Four years ago, it happened that I had a row of trees on the side of my orchard that I plowed in the fall. The variety is Snow's Orange, a very hardy kind. I had, as I say, plowed these early and they were in bloom, three or four days before the rest, and from that row of trees I did not pick a bushel of peaches, though a half row of Snow's Orange, adjacent, bore quite a crop of fruit. They had not been plowed early. I believe in waiting until all danger of frost is over, and then push it.

Mr. Hale: I dislike to dispute with neighbor Adams. Last year, in my old orchard, which is on a little lower ground, though high enough, I did not work until after the frost, because I could not get to it. My other orchards I had worked. My old orchard was, part of it, entirely killed, and the other was not.

Mr. Barry: I think it was a year ago last May that our county society held a meeting at Mears, and they discussed this matter. We had, all of us here, believed in waiting until all danger of frost was over, and we had been practicing that; but after we got through with that meeting, about fifteen growers who spoke on that subject, every man of us agreed that we would begin to work our orchards earlier.

Mr. Rork: There is a difference between an old orchard and a young one. There is a difference in the condition of things when you plow. That has been discussed a little already. If the ground is dry or wet, it makes a difference. I had a strawberry crop saved, once, by the steaming of the ground. It stood in a wet place, and the ground was warmer than the atmosphere, and the steam warmed the atmosphere; if the ground had been colder than the air, I would have had trouble. There are exceptions to every rule, and I think the hint of our president is worth a good deal, and that we should study all these things, these different conditions, location and surroundings, and soil; but even then, somehow, what one man can do another can't, right in the same spot.

Mr. Morrill: That is true.

Mr. Reid: The question was asked if Lewis and Early Michigan are alike, and some one answered yes. The question was asked, what is the difference?

Mr. Hale: I am growing both of these peaches, and I say, fearlessly, that they are not the same. I have both of the Early Michigans—I ordered both kinds. Now, Lewis is a white peach with greenish-white flesh, and the other has a more creamy cast and more solid meat. That is the main distinction I am able to make, although Michigan is uniform and larger.

Q. Which one of the Michigans is it that has a yellowish cast? A. I can not tell you; I have the No. 15 and No. 16, both.

Mr. Morrill: You can tell by the leaf. One has globose and the other reniform glands.

Q. Now, I would like to ask Mr. Morrill if he thinks they are the same?

Mr. Morrill: I have no right to think they are the same. One originated in Berrien county and the other at Lowell, but I have them both in my orchard, and I have watched them closely to find the difference between No. 16 and Lewis, in the color of flesh, color of foliage, etc., peculiarities that any close observer sees in a variety as it goes through the season. No. 15 is different in gland from No. 16, and that is the material difference, and it is not quite so strong a grower. Their origin, however, undoubtedly was different. One originated with Mr. Ray at Watervliet and was planted by Mr. Lewis at Fennville, among Chili seedlings, while Mr. Husted of Lowell claims to have deliberately originated Early Michigan by cross-pollination. Whether both men are telling it exactly right does not make any difference; but these two varieties, No. 16 and Lewis, are so nearly identical that they are practically alike. But if Michigan proves as valuable as Lewis has for me, it is valuable indeed.

Mr. Rork: Did you ever notice any difference in the limbs?

A. Unfortunately, Michigan has been sent out mixed, pretty generally.

Mr. Morrill: I think that five or six years ago, in this room, I asked the question if they were identical, and I was quoted in the papers as saying they were. It made me trouble, and I do not wish to be quoted as saying they are alike, but in my orchard they are very much alike.

Mr. J. H. Hayes: Does any one know, positively, the desirability of Triumph?

Mr. Morrill: I haven't seen the peach, but I talked with Mr. J. H. Hale, and he says the peach was all right with him. Mr. Davison said he had

sixteen trees of a variety that fruited soon after Alexander; it was a large peach with a rosy cheek, and of excellent quality, and he does not know where it originated nor how it came on his place. Its flesh was of a cream color and of excellent quality.

Mr. Morrill: You say it ripens ahead of Michigan?

A. Yes, right after Alexander. It is very large.

Mr. Morrill: Are they some known variety?

A. They were bought for Early Michigan, but are not. They are far out of that season; they are good shippers, do not spot, and look well.

Mr. Morrill: You are describing Early Canada quite well.

Q. Is Early Canada a freestone?

Mr. Morrill: Yes, quite free.

A Member: The peach Mr. Davison speaks of came with Early Michigan. I set them myself, and they have proved, as nearly as I can judge, Early Michigan, only they are two weeks earlier. They are a fine peach, and I set No. 16 the same year, quite a quantity of them. We have tried them two years, and have Lewis the same age, and they seem a better quality; they are of light cream color, while Lewis has a greenish-white color, when it is fully ripe. The grain of the peach is finer and better and the size more even.

Mr. Barry: Will Early Canada grow as large as Mr. Davison says?

Mr. Morrill: I have seen them of very nice size; they are good shippers and profitable. The secretary has a clipping regarding Mr. Hale's big Connecticut orchard which may be of value. Before he reads this, I wish to call the attention of those who have these Reports, and who are inclined to think that brown rot of the plum, cherry, and peach is caused by curculio, to refer to page 303 and read the account of it there.

The Secretary: This account of Mr. J. H. Hale's orchard in Connecticut was written by Mr. H. W. Collingwood of the Rural New-Yorker, and followed his articles describing the Hale orchards in Georgia:

The great Georgia orchard we have been talking about had its origin in Connecticut. The Rural New Yorker has told before now how Mr. Hale and his brother were left when mere boys, at the father's death, on a debt-burdened farm, without capital or experience. They saw clearly that success had only one latchkey—that was to grow some new crop, and grow it well. There is an old peach tree on the farm that is over sixty years old. That old tree showed these boys that it was possible to grow good peaches in Connecticut, so they went to work to fill in the skeleton of that possibility with work and study. They did it, and, therefore, that great Georgia orchard may be said to have sprouted from this old tree.

Of course, the conditions of culture and sale in Connecticut are different from those at the south. The northern orchard is scattered, while in Georgia the peaches grow in one large block. Mr. Hale thinks the soil of the Georgia orchard is the stronger, while the northern fields are more hilly and stony. The cost of growing a tree to a profitable age in Connecticut is twice as much as in the south. The fields are smaller, there are more stones and more hillsides to cultivate, labor is very much higher, and very much more fertilizer is used. The advantages are that markets are much nearer, and transportation is so quickly and cheaply carried on that the peaches may be left longer on the tree, and thus command a higher price because of better appearance.

"You told us how much cheaper the southern labor is," I said, "but is there much saving in the fertilizer bill at the south?"

"Well, you saw how little we have used down there. Up here, we use a ton or more per acre of a mixture of bone and potash—three parts bone and one of muriate. In fact, we do not mix them, but apply them separately. We have used more or less cotton-hull ashes."

"But don't you need more in Georgia?"

"Yes, and we shall use more hereafter. One reason why we used so little there was that we wanted to test the soil and see what it needed. After one crop, we know that it needs more potash to give the peaches more color, and that will be supplied. The cow pea crop is a great help in the Georgia orchard. We have found that certain varieties of cow pea will grow with us here."

Yellows has given little trouble in these orchards. The oldest orchard is now sixteen years old, and has given eight good crops. It is now vigorous and thrifty; good for five more crops at least. Another twelve-year-old orchard is still in excellent condition. The healthy appearance of the orchard is to be attributed to the careful cultivation of the soil and the skill with which the trees have been trimmed and thinned. They are never permitted to overbear. More than half the growing fruit is pulled off early in the season. Mr. Hale shows an orchard of twenty-two acres that was thinned by seven girls during haying time, when the men were busy in the hay field. If a good-size tree produces 500 peaches, it earns its full salary, and should be given a share of the profits—payable in potash and bone.

The color of these northern peaches is something remarkable—a dark, rich crimson cheek, "Potash paints the peach," is Mr. Hale's motto, and he says that nothing but an ample supply of potash will give this rich coloring.

The varieties grown at the orchard are Mountain Rose, Early and Late Crawfords, Stump, Oldmixon, Salway, Alberta, Crosby, Smock, and Keyport White. This gives a good succession. In Georgia, but two grades are made, but in Connecticut three grades are packed, each one with a certain colored label—the largest red, second size white, smaller blue. The culls are sold without label. The Hales are patriotic people, for the "red, white, and blue" are displayed everywhere.

When asked to give the proper distance apart for trees, Mr. Hale took me to an orchard of twenty-two acres, one half of which is set 18x18 feet and the other half 12x12. Accurate account has been kept of the relative profits of these two halves, and, with five crops, the closer-planted half is \$7,000 ahead. While the other may gain somewhat now, it can not entirely catch up. It was this experiment, chiefly, that induced Mr. Hale to set the Georgia orchard 13x13 feet.

Some weeks ago, I spoke of the effect of girdling on an Alberta peach tree. This tree split open and, to bring it together, the workmen put a wire around both limbs of the crotch and pulled them up by twisting the wire around with a stick. The wire cut through the bark and girdled the tree. As a result, the tree was filled with fine great peaches, while the other Elbertas were green and hard—at least ten days behind in ripening. It will probably kill the tree, but this accident suggests an experiment that Mr. Hale will try next year. He has an orchard on leased land, the lease of which expires in two years. Next year, he will girdle 100 or more trees in various ways, and thus see the effect on quite a large scale. The next year, if necessary, he can girdle the whole orchard for his last crop, even though it kill every tree. If it will hasten the ripening of some of the earlier varieties by ten days, the increased price would pay for the trees.

Some of the white workers in the Georgia orchard had the pluck and ambition to follow the business north, and are at work handling the Connecticut peaches. The way business is conducted at the north was a revelation to these young men. "Why," said one of them, "I can stand on a corner in Hartford and see more people in half an hour than I could see all day in Macon, Ga." These great, thriving centers of population, with the thousands of workers right at the end of an electric wire, may well seem wonderful to those who have known nothing but the market needs of a small city. In fact, the dazzling changes that are taking place in New England agriculture may well take away one's breath.

"If you will get up at two o'clock," said Mr. Hale, "we will show you a new trick about marketing peaches."

The electric road from Hartford runs directly past Mr. Hale's house. There is a side switch in front of the orchard, and on this, during the day, three empty passenger cars were left standing. All day long, the peach baskets were packed into the cars. When we got up in the morning we found an electric car from Hartford hitched to the three cars of peaches. With Mr. Hale's son for conductor, and his little girl for passenger, we went whirling at a twenty-mile gait into Hartford, with 1,000 bushels of peaches behind us. There was no stop until we reached the store of the Hartford agent. By six o'clock a. m. the peaches were all

unloaded, sold, and distributed, and the empty cars hauled back to the side-track in front of the orchard, ready for another load.

There was a saving of the work of, at least, ten teams; all done quickly and without fuss. That is what farming is coming to. The same thing might be done in thousands of other localities. These light electric roads must be made to serve the farmer by hauling freight as well as passengers. At the opening of the peach season Mr. Hale hired cars, decorated them with flags and labels, and made great bowers of peach boughs with the fruit hanging. Then, with sixty local fruit dealers seated in the cars, he ran all over the electric lines of Hartford. Why not? Why not advertise the peach business as well as the clothing trade?

The coming farmer must make use of all these new devices, or some one else will take the chance away from him. It will not be many years before a carload of cotton-hull ashes can be shipped from Georgia, and run right into the Connecticut orchard without being once opened. These electric lines must be of use to farmers for freight. It is but a question of time before a large proportion of New England marketing will be done by electricity. The fact that it can be done, gives New England farmers a great natural advantage.

Mr. Reid: Mr. President, suppose you give the growers some idea of the practice of cutting back and heading in, which makes the cultivation of peaches at twelve feet apart profitable.

Mr. Morrill: I can not give any one an idea which would make practicable the setting of trees twelve feet apart.

A Voice: I understood Mr. Reid to say that Mr. Hale's practice is to cut them back.

Mr. Reid: I understand that he does, somewhat after the manner of Mr. Morrill's pruning today, and that he constantly heads in for several years, successively, and grows the trees a short distance apart, claiming that he will get a greater profit in the lifetime of an orchard. It says here that he sets 12 x 12 in Connecticut and 13 x 13 in Georgia.

Mr. Hale: I have been all through his orchard in Connecticut, but the trees are grown upright. I never saw trees with such long, slender growth in my life. He does not cut back. He told me he thought he would cut back his younger orchard. He fertilizes heavily; his three-year-old trees look like six-year-olds. But they winter-kill, badly. He said it had occurred to him that it might be because he fertilized too much. One orchard, where they had not fertilized at all, looked like ours.

Mr. Morrill: In Michigan, I would not set a peach orchard closer than 20 x 20. That is close enough for me.

Q. How about plums?

Mr. Morrill: You people know more about plums in a minute than I do in a week.

Mr. Rork: We would set them the same distance you do the peaches.

Mr. Rouse: I put them 10 x 20, and it was too close.

Mr. Morrill: Have they been cut back?

Mr. Rouse: Some, but ten feet is not enough.

Q. Have they been systematically cut back? A. I guess not.

Judge Russell: I should say twenty feet each way.

Mr. Morrill: They say Judge Russell has the finest orchard in the world.

Judge Russell: They have lied about me for twenty years! I am setting eighteen feet apart.

Q. And are you cutting back regularly? A. Yes, sir; I am trying to follow Mr. Willard's instructions. I do not know where I am going to

land, but I am working along that line, cutting back from one half to two thirds every year, and I have some very fair-looking trees, though they have never borne very much yet.

Mr. Barry: I have only a few plum trees, set five years ago, and at the end of the five years they were throwing up shoots in the middle of the row. They were set twenty feet apart. I don't worry about the sprouts, but the roots will occupy all the space you give them.

Mr. Rork: Does any one know if the life of a plum tree on a peach stock is as long as on a plum?

Mr. McClatchie: Some twenty-eight years ago I read that plums would grow on peach trees. I tried it. Every one grew. They are standing today, large, thrifty, and healthful. They made better growth than other trees, and have borne more plums.

Q. While they are speaking about plums, I would like to ask a question of the gentleman who recommended grafting plums on older peach trees, top-grafting, if it made any difference when the grafting was done, early or late? A. It should be done early, real early in the spring.

Mr. Reid: Something was said about the Breed weeder being high-priced. What is the difference between that and the other tools?

Mr. Morrill: The price is about \$14 for a No. 4, the best pattern, and I should not hesitate at the price.

Judge Russell: They are selling their weeder this year for \$11.50.

Mr. Morrill: You can send to the factory in clubs and get them here, for \$12.50; \$12 to \$12.50.

Judge Russell: I was corresponding with the Boston office and they said they were introducing them at \$11.50.

Mr. Morrill: Then there would be the freight added, and it would be \$12 to \$12.50 here, and the retail price in this state is \$14.

Q. What sweep has the No. 4? A. Eight feet. The No. 4 is sectional, in three sections. You can take off the two outer sections and use it between rows, or, you can set it together for full width. I bought four of the No. 4 for my place. We have five this year.

Q. Do they straddle the row? A. They say not. I have used it in the peach orchard and think it is a grand tool. The land, though, must first be fitted, and then you put on your Breed weeder and keep it at work.

Mr. Rice: I used it on potatoes last year, four inches high, and it did not disturb the plants. You have to use it, though, before the weeds show.

Mr. McClatchie: I have cultivated corn, one foot high, and it did not do any harm. It is a poor thing to take weeds out, but a good thing to keep weeds from coming up.

Q. Is there much difference between the Universal Breed weeder and the "Z" Breed weeder? I had an idea from what I heard at the institute in the winter that the "Z" was best.

Mr. Haight: I was just going to speak in regard to the price. With us, this winter, they are offering them, freight prepaid, for \$11.50, the No. 4, and they offered to any one getting up a club of seven to put in an extra one, and that brings it down to the neighborhood of \$10.

A Member: I would like to answer that question regarding the difference between the Universal and the "Z." I have both, and I would

prefer to use the "Z" every time rather than the Universal. The Universal is not sectional, and it is straight in its tooth; it will go deeper than is necessary, unless you carry the whole weight of the machine in your hands all the while. With the "Z" you won't have to do this. There are two advantages in the "Z" that are not in the Universal. The sectional part you can use as long as necessary, in its full form, and then take off the two sections and use it among the potatoes and corn, and you can use it anywhere that you can use an ordinary cultivator. If you are going to make a success with either style, you must use it before your weeds get too far up, or you can not use it to satisfaction at all. You have to be ahead of the weed and not let it get ahead of you.

Judge Russell: I started in with a Breed weeder last spring, and undertook to cultivate my orchard with one, and I am satisfied that with an ordinary farmer they would not be of much value. I am satisfied that if we would get the best results from one of these we must take better care of the soil, and be more thorough as we go along. I undertook to take good care of my orchard last summer, but I found that after I commenced cultivation with the weeder I did not seem to have courage enough, and finally concluded to get a smoothing-harrow, which worked better. In fact, I condemned the weeder, but, after talking with Mr. Morrill and Mr. Kellogg I became convinced that perhaps the difficulty was in part with myself. Therefore, I say, if you gentlemen are going to use a Breed's weeder, and expect to get good results, you must tone yourselves up and do better work than you have been in the habit of doing.

Mr. Wright: In the use of the Breed weeder, we provide another farm implement, to be used if the weeds get a little too far ahead. We use the Aeme harrow. This gets the soil in such condition that you can profitably use the Breed weeder. I have used the "Z" weeder when the corn was thirteen inches high, and on potatoes when they were nine inches high.

Q. Doesn't it work differently on different soils? I should think that Judge Russell had a heavier soil. What I want of a weeder is to retain moisture in the land after it is thoroughly pulverized on top. A. That is one of the principal benefits.

Judge Russell: Most of you know where my south orchard is. There isn't a man in Oceana county but has been in it, and it is a sand land where I used the weeder, and land that is sandy enough for anybody; but if the weeds are half an inch high there is no use going over them with a Breed weeder.

Mr. Barry: Is it essential to plow a peach orchard after it is five years old, or can you stop plowing and use a spring-tooth harrow and other lighter tools?

Mr. Hutchins: It depends. Some people do well on light soils without plowing, but the surface needs turning down.

Mrs. Perkins: When is the best time to plow in setting a new orchard?

Mr. Morrill: What is the character of the soil?

Mrs. Perkins: Sandy.

Mr. Morrill: My own opinion is, if it is possible, to do it in the fall. I would, in order to set the trees the first good day in the spring.

Mr. Dunwell: Do you know of any crop that will make a growth to hold snow and make a mulch in the spring?

Mr. Morrill: I have a neighbor who is using oats. They live long enough to catch all the foliage that falls, and they furnish sufficient material to catch and hold the snow, and in the spring they are a dead mulch; and they protect the land by saving the leaves where they fall, and prevent severe freezing and too rapid thawing.

Judge Russell: What time do you sow them?

A Member: We sowed, in a portion of our orchard last fall, crimson clover. That is one thing I have neglected. I should have brought a stem. It is looking finely now, but whether it will stay, and go on and make a growth, after the freezings and thawings of March, I don't know; it looks well now, however.

Q. When did you sow it? A. After the first rain in August. The first time it was moist enough.

Q. How high did it get in the fall? A. It did not stool out at all. We also sowed seven acres with a drill, after turning a rye crop under. That is looking finely. Have any others tried it?

Mr. Morrill: There is a good deal of doubt about crimson clover. In western New York, the experience seems to have been the same as here. They went into the matter thoroughly in Rochester, but the concensus of opinion was that, even if it never lived the winter through, it was profitable to sow it. At the same time they agreed that there was danger in attempting to sow it in a peach orchard; that it secreted an excessive amount of nitrogen if it was continued too long. But experiments conducted at Cornell showed the value of an acre's growth was \$13, dead the first of December, and from that down to \$7 or \$8, and from that they concluded it was very profitable. Some men, however, further east, said that even where it was killed there were good results.

Mr. Rice: Do you know whether the two have been compared, oats and crimson clover?

Mr. Morrill: I don't know of any such comparison. My own opinion is that the principal benefit to be derived from the oats would be simply the retaining of the foliage and the covering of the soil to prevent freezing and thawing and not so much for the manurial value of the oats.

Mr. Rice: When we sowed crimson clover, we did not sow it for the green growth, but for the fertilization from the root. When you get crimson clover that will stand three inches above the surface of the ground, you will have roots nine inches below the soil. We sowed it for the benefit of the fertilization from the root. When the plant was two or three inches above the ground the root would be eight or ten inches in the ground, and there would be a mass of fibres as large as your hand.

Mr. Morrill: That is true, and the root is as good a nitrogen trap as the ordinary red clover.

Mr. Rice: Yes, sir, you derive these benefits from the same source as in case of large red clover.

Q. Is it profitable to put ashes around young peach trees, when setting in the spring?

Mr. Morrill: Keep it away from your roots. If you have ashes to apply, put it on broadcast. The potash will not get away until used,

on most soils, and it is valuable in most peach orchards, although I have heard it said, today, that it was not; but with me, it has been valuable.

Mr. McClatchie: I have tried it at the rate of 100 bushels per acre, and could not observe any benefits. Of course this land was new, had not been cleared more than eight or ten years.

Mr. Morrill: Was the timber burned on the land?

A. Yes, sir.

Mr. Morrill: Undoubtedly it was well supplied with potash. If your land does not contain the potash, you must supply it, but I don't think any man can set down a general rule for the application of potash or of other fertilizers. I have used a carload of commercial fertilizer on some land, with good results, and on other with none. I have two farms. On the one, I never apply ashes, but on the other we are continually spreading ashes, because I have seen a return of not less than \$50 per ton where I have applied ashes.

Q. Are our early peaches, clings and partial clings, going to be profitable any longer?

Mr. Dunwell: I should think that would be according to the conditions. What affects our early peaches now is the southern trade, and I think if their crop should be killed ours would be valuable.

Mr. Morrill: They are killed, three years in five.

Mr. Dunwell: That is the reason why I don't know whether it would be best to stop raising the early peaches. I think if I had good varieties of early peach, I would keep them.

Mr. Hutchins: In setting a peach tree, would you put a handful of oats in, to form a mulch?

Mr. Morrill: I wouldn't. Perhaps some one else would.

Q. Is there any experience in regard to cut-worms destroying our young trees? Has anyone a new remedy?

Mr. Morrill: What have you tried?

A. Nothing very much, but I have had some trouble.

Mr. Barry: Some tried molasses and Paris green. I wonder how they came out.

Mr. Warner: I believe I can give a remedy for the cut-worm, the first year. Use buckwheat the year before. Sow it in the ground, and you won't be troubled with cut-worms. I know this by experience, and, if you want to be rid of them right along, use buckwheat,—sow it every year, though I won't warrant it for more than one year at a time.

Mr. Rice: Someone told me to sow buckwheat. I did so, and have not been troubled much with cut-worms. When I stop cultivating in August, I sow buckwheat and mix it with rye. If the buckwheat ripens, I leave it for the quails, and in the spring I turn under the rye, and I think using the buckwheat with the rye helps.

A Voice: A good remedy is to take tarred paper, cut it into squares of ten inches, split them to the center, wrap around the tree and bind there.

Mr. Rice: That is a very good idea. Wool is a failure.

Mr. Morrill: Do your Oceana county cut-worms carry step-ladders?

Judge Russell: I am very glad to have such a man as Mr. Rice here to back me up in my statement to you. I told you wool wouldn't stop them, and of course you know better.

Mr. Morrill: No, I don't know anything about your kind of cut-worm. Either there is more enterprise among them here, or something, but I know they will not go over wool on my farm.

Mr. _____: The only remedy I have found is the thumb and forefinger.

Mr. Morrill: That is a tedious way.

Mr. Reid: Have you ever tried spreading poisoned foliage around, Paris green on dock leaves?

A. Yes, but the wind blows it all away, and you have to replace it next morning. Another good remedy is to take common turnips, cut them into slices and soak them in a strong solution of Paris green. They will remain fresh for three days, and will rid the land of cut-worms. I tried it and saved a large corn crop.

Q. What about sowing buckwheat—will it keep away the borer? I thought it did, in my orchard, once.

Mr. Morrill: It seems to be an objectionable plant to some insects.

A Member: I find the borer as much where I sow buckwheat as where I don't.

A Member: Last year I set 500 peach trees and sowed buckwheat on all that ground with the exception of three fourths of an acre. On the buckwheat ground I scarcely found a cut-worm, but on the small patch where I had potatoes I found any quantity of them. Had to fight them.

Judge Russell: There is one thing that has not been referred to, today, and which, it seems to me, is of a good deal of importance. The question of pruning. I would like to have Mr. Morrill give us some statements with reference to the pruning of a peach tree, commencing with a small tree. It is a matter we don't claim to know much about, and I believe it is important.

Mr. Morrill: Many of you have had more experience than I. I have no objection to detailing my method, although I have told it so many times, that it seems "a chestnut." My practice is, after setting a tree, and allowing the young growth to start, the same season to take off all the limbs except those that I wish to form the top, to give the tree from twenty inches to two feet of clear body, then select from three to five strong limbs within the next twelve to sixteen inches of body, and the top, in setting, is cut off at that point. At one year old, we cut back the growths that are excessively strong. With most trees, when they start, some growths will be stronger than others. At the same time, if I find a limb that ought not to have been left, I take it off. The following year I calculate to have them pretty evenly balanced, so far as growth is concerned. I keep cutting back the strong and encouraging the weaker. The following year I cut back the annual growth one half, and where I had cut back the year before, I thin out.

Judge Russell: In starting your top, do you pay any attention to the number of branches you start? A. Yes, from three to five, depending on what I want to get.

Mr. Morrill: Let me say right here, that a man who trims a tree and forms it right must have an ideal in his head. He must have a plan according to which he is going to build that tree, and that plan can

not always be the same that he adopts for its neighbor. They are never exactly alike. You must plan your tree somewhat in reference to the local conditions, the prevailing winds, and a number of such things, which must be studied for years. Each year following, I cut back from one half to two thirds, and thin out the excessive thickening. In cutting off a strong limb, I usually select an outer bud or shoot, off of the main one, and cut to that, so that it will be the strong limb. Then it will take a strong growth in the direction you wish, without too much thickening. I have abandoned the practice of a leader in the center of the tree. I started with that, and if I were in a southern climate I would still do so, but I discovered that on the north side of the tree I did not get the perfect coloring I wanted, not as good as on the south side, so I cut out all those leaders I had saved, and have had finer fruit since. This cutting out, as I do it, leaves trees looking as though there wasn't much of them until the growth starts, but they soon fill up and make the rankest, finest trees in the world.

Mr. Dunwell: What is the expense of pruning an orchard four years old, by your system, heading back? A. That depends on how much growth you have on it. I think it costs me \$1.50 to \$1.75 per acre; but, as the age increases, the labor increases, infinitely. Last year, my eight-year-old trees took nine to nine and one half days to the acre. My foreman gave me the figures this winter of the time he spent with the men there, and I think it was nine or nine and one half days to the acre, with the shears. We work with the hand pruning-shear, on a ladder. It may be slower and more tedious, but we know it is all right. Taking it by the acre, the whole lot, different sizes and varieties, it would be about nine and one half days per acre, on the eight-year-old trees.

Mr. Rice: In cutting back the leading shoots of a four or five-year-old tree, would you clip your extreme outside shoots in proportion, in symmetrical form, or would you leave them to continue their growth? A. I trim the middle shoots a little the hardest, because they are a little the strongest. I mean just the strong ones. The short shoots are really the fruiting limbs of a tree, but I thin those out.

Mr. Wright: If in cutting back your leading shoots you bring them down on a proportionate level with your outside shoots, could your outside shoots then form a symmetrical tree, or would you leave the outside shoots to continue? A. You have seen pictures of the old-fashion bee hives. I make my trees conform as nearly to that as they will permit, and that often leaves the outer shoots longer and shortens the upper shoots harshly. I thin so that when the pruning is done, and it should be done before the foliage is out, it looks very thin, and, except you look up a row, you will hardly catch any form of it; but after the leaves are out, you see the form.

Judge Russell: You say it should be completed before the foliage is out?

Mr. Morrill: Yes; if the foliage is started, it checks the growth materially.

Q. How soon do you begin?

Mr. Morrill: In about ten or fifteen days from now, and then use every nice day, every day that will be comfortable for the men.

Mr. Rice: If after beginning your pruning, ten days from now, you were not able to get through before the sap started to flow freely, would you discontinue your pruning for that season, or would you prune, and abide by the results?

Mr. Morrill: I never stop until I finish, though I would hustle around and get help.

Q. Would there be any serious damage from pruning, should there come a frost?

Mr. Morrill: On what is known as the Pier farm, north of me, there are six hundred acres which are largely set to fruit. The foreman is an intelligent German, and he was telling me a few days ago that for four or five years he has done his pruning in the winter, whatever he could. He told me, Monday, that they were all done now, and so far he has never seen any damage. I know he is an observing man, and careful. I almost wish my men were pruning now, but the days will be longer by and by.

Prof. Slayton: There is no great difference at what time you cut back the annual growth, but the earlier you do it the further you must cut from the last bud you want to grow. If you cut in January, cut one fourth of an inch beyond, because the bark will kill down a certain distance, according to the length of time until the bud starts to grow. If you do it the first of April you must cut close to the bud.

Mr. Morrill: Our time of pruning being March and April, we cut close to the bud we wish to draw out, and it always comes. There is one thing I have noticed, that has made me think the fall might be a good time for pruning. In budding we have selected trees in the orchard that we like to use the wood from. We take them off in September, the strong terminal shoots, such as will do for budding, and the tree throws out very strong buds. The balance of the wood develops very strong fruit buds, and they winter perfectly, and those trees appear to be getting better and better. I know that a few years ago a theory was put out of September and October shortening in of peaches, but I was always a little skeptical; but this practice for a number of years, on the same trees, has led me to believe, by the results observed, that it is all right.

SELF-STERILITY AMONG CULTIVATED GRAPES.

BY PROF. S. A. BEACH OF GENEVA, N. Y.

It has long been known that some kinds of cultivated grape, either form imperfect clusters or set no fruit at all when they are planted alone. Because they are unable to fruit satisfactorily of themselves they may properly be called self-sterile. Many of the self-sterile grapes yield abundantly when they are planted near enough to other kinds so that their blossoms may be fertilized.

A similar condition exists among cultivated strawberries. In the catalogues where strawberry plants are offered for sale the letters "p" or "s" are usually placed after the names of the varieties, to indicate whether they are pistillate or staminate. The pistillate kinds have imperfect blossoms and can not fruit alone. To secure fruit from them it is necessary to plant staminate varieties near enough to insure fertilization of their blossoms.

But there is quite a remarkable difference between the self-sterile strawberries and the self-sterile grapes; for it is easy to see that the strawberry has an imperfect blossom, while the fruiting grapevine always bears perfect blossoms.

An examination of the strawberry blossom shows at once that the male organs, called stamens, either are wanting or exist only in rudimentary form. In the self-sterile grapes the stamens are always present and produce pollen. The only apparent structural difference between their blossoms and those of self-fertile kinds is that some of the former have short stamens. Even this difference is not always found, for, as we shall show later, some self-sterile grapes have long stamens like those of the self-fertile grapes.

The extent to which self-sterility exists among American grapes is evidently a subject of much practical importance to vineyardists, yet it is only within recent years that it has been carefully studied. So far as I know, the first accounts of systematic investigations with grapes in this line that were ever published were those issued in 1892, giving the results of my experiments for that season. The work which was then undertaken has been continued during each succeeding year with as much thoroughness as time and opportunity would permit.

The work has thus far been conducted solely in the vineyard of the New York state experiment station, Geneva, N. Y., where the large number of varieties which are readily accessible afford a very favorable opportunity for making observations on this subject.

About one hundred and fifty varieties have thus far been tested here as to their self-sterility. These include nearly all the important old varieties and most of the promising new sorts. The results show that there are many kinds of cultivated grape which can not of themselves set any fruit, as for example, Brighton and Eldorado; other kinds form small, seedless, or abortive berries or imperfect clusters, as Duchess and

Woodruff, and still others, like Delaware and Niagara, set perfect clusters. Here is found one explanation for many cases in which disappointment has followed the extensive planting of new varieties which, when grown in mixed vineyards, gained a reputation for productiveness. When, on the strength of such reputation, their cultivation was extended and they were planted alone, partial or complete failure to fruit has been the result, because the variety was self-sterile. Unless a grape has been thoroughly tested and found to be able to set fruit alone, it is certainly unwise to plant it in vineyard blocks by itself.

The method followed in these investigations has been to cover the clusters with paper bags before the blossoms opened, thus preventing the fertilization of the flowers by pollen from outside clusters. It is evident that any fruit which formed within the bags, under such circumstances, must have been produced from the covered blossoms alone. The kinds of grape that are able to form perfect bunches of fruit under such conditions may reasonably be expected to possess the power to set fruit of themselves, and do not need to be mingled with other varieties. After the fruit ripened, the covered clusters were examined and compared with the uncovered clusters which grew on the same vines. It should be remarked that the vines which were under experiment were all located in vineyards of mixed varieties, and so the uncovered clusters had plenty of opportunity to be fertilized by other varieties.

In cases where, for any reason, the test has been unsatisfactory, it has been repeated again the following season, so that the results which are here given are believed to represent very closely the real character of the different varieties mentioned, so far as their self-sterility is concerned. Possibly, under different conditions, some of them may show a difference in their ability to set fruit alone, but I know of no instance in which healthy, vigorous vines of any of these varieties have shown such a difference.

In order to present the results of these experiments in concise form, the varieties under investigation have been classified as to their ability to set fruit, when self-fertilized, into four classes. The ability to set fruit when self-fertilized means, in other words, the ability to set fruit of themselves unaided by pollen from any other variety. The following classes are based wholly on the development of this characteristic:

Class I includes those grapes which forms practically perfect clusters when self-fertilized. In this class are found Ambrosia, Bertha, Croton, Delaware, Diamond, Early Golden*, Etta, Herald, Janesville, Lady Washington, Leavenworth, Lutie, Mabel*, *Marrin's Seedling White*, Mary's Favorite, Mathilde, Metternich, Monroe, Moore's Early*, Niagara, Opal, Poughkeepsie Red, Prentiss, Profitable, Rochester, Rogers' No. 13, Rogers' No. 24, Rogers' No. 32, Senasqua, Telegraph, and Winchell.

Class II contains those varieties which, when self-fertilized, are likely to produce rather loose or unsymmetrical clusters, although perfect enough to market well: Agawam, Alice, Big B. Con., Brilliant, Burrows No. 42c, Carman, Catawba, Caywood No. 50, Centennial, Champion, Chandler, Clinton, Colerain, Concord, Cottage, Diana*, Early Ohio, Edmeston No. 1, Elsinburg, Elvira, Empire State, Esther, Glen-

*Further investigation may show that this variety belongs in class II.

feld, Golden Grain, Hartford, Highland, Hopican, Illinois City, Isabella, *Isabella Seedling*, Iona, Jefferson, Jessica, Lady, Leader, Lindmar, Little Blue, Mills, Missouri, Reissling, Olita, Paradox, Paragon, Perkins, Pocklington*, Rockwood, Rommel, Rutland, Standard, Triumph, Ulster, Vergennes, Victoria, Wheaton, Worden.

It appears from these investigations that the grapes named in classes I and II can set fruit satisfactorily of themselves and may safely be planted alone.

In the following classes are named those varieties which, when self-fertilized, produced imperfect and unsatisfactory clusters or utterly failed to set fruit. If any of these are set at all they should be mingled with other kinds in order that their blossoms may be properly fertilized. Possibly, as stated before, some of these varieties may differ under different circumstances, as to their ability to set fruit, but I have not known any of them to do so.

In class III are named those grapes which produced some fruit, but the clusters were likely to be imperfectly filled and unmarketable. Some of them, like Eumelan, rarely set any fruit, while others set moderately compact clusters, and all gradations were found between these two extremes. This class includes Adirondack, Alexander Winter, Amber Queen, Beagle, Canada, Canonicus, Daisy, Dr. Collier, Dracut Amber, Duchess, Early Market, Eumelan, Geneva, Gold Dust, Nectar, Noah, Northern Muscadine, Norwood, Perkins, and Woodruff.

Class IV contains those varieties that either set no fruit or formed abortive berries which never developed into perfect fruit: Aledo, Amber, America, Aminia, Barry, Black Eagle, Blanco, Brighton, Burnet, Clevener, Creveling, Denison, Dr. Hexamer, Eaton†, Eldorado, Elvibach, Essex, Faith, Gærtner, Grein's Golden, Hayes, Herbert, Hercules, Jewel, Juno, Lindley, Marion, Massasoit, Maxatawney, Merrimack, Montefiore Norwood, Red Bird, Red Eagle, Requa, *Rogers' No. 5*, Roscoe, Rustler, Salem, White Jewel, Wilder.

In the early history of grape culture in the United States, east of the Rocky mountains, numerous attempts were made to grow European varieties, but without success. Among the chief causes of failure, as we now know them, were their susceptibility to the attacks of rot and mildew, and, worst of all, to the attacks of a native insect known as phylloxera.

Baffled in their attempts to secure vineyards of such grapes as were successfully grown in Europe, the American fruitgrowers turned their attention to the native wild vines. Improved varieties of these were gradually introduced into cultivation, and as a result grape-growing has become a permanent and important industry in many sections of the United States, where all previous attempts to establish vineyards of European varieties had failed.

About forty years ago great interest was aroused over the possible rapid improvement of American grapes by the production of hybrids between the native species and the choice European kinds. At that time the remarkable series of hybrids produced by Mr. E. S. Rogers of Salem, Mass., known as the Rogers Hybrids, began to attract attention. Many

*This variety may belong in class I.

†Further testing may show that this belongs in another class.

others besides Mr. Rogers undertook the same line of work, and during the next thirty years there appeared numerous hybrid grapes of undoubted excellence, so far as the fruit was concerned. Many of them were very attractive in appearance and of remarkably fine quality. A few of these hybrids have proved valuable for commercial vineyards, but it must be conceded that on the whole the results of the efforts to improve American grapes by the production of hybrids with European varieties have been disappointing. The purely native kinds, such as Concord, Worden, Catawba, Moore's Early, and Pocklington, still form the bulk of the commercial vineyards. Moreover, many of the most successful vineyardists of the country declare that, for commercial vineyards, it is still best to plant only varieties of purely native origin. Personally I do not favor quite so radical a view on this question as that just stated. It must be admitted that there is good ground for looking with suspicion on any new candidate for the commercial vineyard which shows traces of European parentage. But there are some of these hybrids which are several generations removed from the European parent, which may properly be looked upon as high-grade natives. These may show but slight traces of European parentage, and in them we may find hardiness, vigor, and productiveness of vine combined with attractive shape and color of the fruit cluster and good quality of fruit. A good illustration of such a variety is found in the well known Niagara, undoubtedly the most popular white variety for commercial vineyards grown in the eastern United States.

By raising seedlings from self-fertilized seed of Niagara, I have demonstrated that this grape is not, as some have supposed, purely of the Labrusca or Fox Grape species. It is certainly a hybrid, and evidently it is partly of European origin. Delaware is another example of a well-known commercial variety which is generally conceded to be partly of European origin. Moreover, a very few of the newer grapes which are known to be hybrids seem to possess the characteristics essential to a successful variety for the commercial vineyard. So, while admitting the general truth of the proposition that in the eastern United States the successful commercial vineyards are composed chiefly of purely native grapes, we nevertheless have reason to expect that new and superior kinds may be developed by breeding what I have termed the "high-grade natives."

In this connection it is interesting to note the parentage of the vines in the four classes above named, and observe the relation that exists between hybridity and the ability of the variety to set fruit of itself. It is found that more than four fifths of the fourth or self-sterile class are hybrids, while less than one half of the self-fertile kinds included in classes I and II are hybrids. So we see that the proportion of self-sterile kinds is much greater among hybrids than among varieties which are purely of one species. That is to say, hybridity among grapes appears to favor self-sterility.

The data collected in connection with these experiments also afford material for a study of the correlation of the structure of the flowers and the ability of the vine to fertilize its own blossoms. In the perfect blossom are found both male and female organs well developed, as for example, in Concord, Niagara, Worden, and most other commercial

varieties. In such blossoms the female organ, called the pistil, occupies the center of the flower. After it is fertilized this develops into the berry or fruit. Immediately surrounding the pistil are the male organs, the stamens, which are thread-like and tipped with tiny yellow sacks. Some vines produce none but male blossoms; that is to say, the stamens are well developed but no pistil is found. These, of course, are never cultivated, for they never can bear fruit. There are vines, on the other hand, whose blossoms have a well-developed pistil, but the stamens are short and curl down and back toward the stem of the blossom as soon as the flower opens. Among the well-known kinds that have such short stamens may be named Barry, Black Eagle, Brighton, Essex, Eumelan, Gaertner, Lindley, Marion, Massasoit, Merrimack, Salem, and Wilder.

It will be remembered that classes I and II, as given above, contain self-fertile varieties only. It is a remarkable fact that not one of these kinds has short or recurved stamens. So far as I know there is no variety of grape which has short stamens that is able to set fruit satisfactorily alone. It is safe to say, as a rule, whenever a grape is planted which bears short or recurved stamens it should be planted near some other variety, in order that its blossoms may be properly fertilized. Otherwise it will be likely to produce imperfect clusters or utterly fail to set fruit.

But one fourth of the self-sterile grapes named above in class IV have long stamens, while in class III, that includes the grapes which of themselves can form only imperfect clusters, four fifths of the varieties have long stamens. So we see that long stamens are not a sure indication that a variety is self-fertile, although all the self-fertile grapes that we know invariably have long stamens.

Reviewing briefly the points noted in this essay, we observe:

1. Before setting any untried variety of grape in a commercial vineyard it should be determined whether such variety is able to set fruit when standing alone.
2. One great hindrance to the improvement of our cultivated grapes by hybridizing them with choice European, or Old World, varieties, lies in the fact that so many of these hybrids prove to be partly or completely self-sterile.
3. Grapes with short stamens are, so far as we know, wholly or partly self-sterile.
4. Self-sterile varieties may fruit satisfactorily when they are planted near other kinds of grape—so that their blossoms may become fertilized.

DISCUSSION.

Mr. Reid: I suppose there must be some gentlemen present who have noticed something with regard to this matter of fertile and sterile bloom in their orchards of plum and pear in this county, and some of them should be able to tell us concerning it.

Mr. B. Gebhart: I have not taken particular notice of it; still, I have noticed that there are better and larger crops of some pears if they are mixed with certain other varieties, while in cases where they stand alone, perhaps in the same soil, they do not seem to produce fruit,

though I never paid any particular attention to the different varieties in classing them.

Mr. Brassington: I have a hillside; the soil is gravelly, rather porous, so much so that it does not wash with heavy rains. It is inclined to the east and south, quite steep, but can be cultivated. I intended to set it to grapes, but not having had experience in their culture I really did not know what variety to set, and whether it would be a suitable place to grow them.

Mr. Benton Gebhart: In regard to soil I can not answer. As to varieties, I have been testing about thirty different sorts and have come down to about three, for profit in marketing, as well as for my own use, Worden, Niagara, and Brighton. I find that these are the best and most productive, and ripen in time for market. The trouble with many varieties is that in this region they will not color, and the fall atmosphere seems to be too damp.

Q. Then Concord is not in your list? Mr. Gebhart: That does well, but I claim that Worden is far ahead of it. Empire State has never done anything for me.

Mr. Morrill: What is your opinion as to exposure?

Mr. Gebhart: I prefer southeastern, just as warm as we can get it; get away from the lake breeze all we can. If we can get behind a hill, on the southeast slope, I think it is preferable.

Mr. Burdick: I have had a little experience in growing grapes on a side hill. The hill is rather sandy, top-soil, underlaid with clay. In setting I dug down four feet through the sand to the clay, and filled in the top soil. My varieties are Concord, Delaware, and Worden, and they have done well. The slope is southeast; a pretty steep hill.

Mr. Brassington: Would you recommend Delaware, Mr. Morrill?

Mr. Morrill: With us Delaware sheds its foliage, except under excellent care and cultivation. I am not a grape-grower at all, myself.

Mr. Burdick: With me it carries its foliage well.

Mr. Morrill: Where it does, it is an excellent grape from which to get money.

Mr. Slayton: I have had no experience in this county; at Whitehall I cultivated grapes several years. I had only three or four varieties; they did well, but it was on level ground, the first plateau above the lake. Martha and Concord were the ones I had there, mostly, and Wordens. With my present experience I should choose the three named (Worden, Brighton, and Niagara) for family use. Worden and Brighton first, and if you must have a white grape, Niagara.

Q. What would you consider the best market variety for commercial purposes? Mr. Slayton: For this locality? That I could not answer.

Q. Well, in your experience? Mr. Slayton: For our locality, around Grand Rapids, our best market varieties are Worden and Concord. But grapes are dead with us. Seven or eight years ago we could get ten or eleven cents per pound for our first grapes, and they would gradually fall to three or four cents. Last fall we could not get more than two cents for the first ones on the market.

Mr. Brassington: Would that pay the cost of production?

Mr. Slayton: I do not know.

Mr. Reid: I have heard the growers at Paw Paw and Lawton declare that two cents, with full crops, is a paying price. Of course they would like to get more.

Mr. Morrill: Our people at Benton Harbor and St. Joseph claim to me that they can make a fair profit at 11 to $12\frac{1}{2}$ cents per ten-pound basket, delivered on the street there, and that is not one cent per pound for the grapes themselves. But they get a crop of anywhere from three to six tons per acre, under good culture, and with a little knowledge of the cost of pruning, staking, wiring, picking, and hauling, you can very easily figure it out and see whether it will pay. The growers there are, as a rule, quite large growers, and that makes a difference. As to the best market varieties, Worden is fast superseding Concord on the Chicago market. It is better in every way, though in long shipments it shatters a little worse. It is not quite so tough and durable. Brighton, while it will not produce with us to compare with either of several other varieties, is, when it comes on the market, an excellent seller. Niagara meets with a fair sale in limited quantities. No one should get the impression that white grapes are going to take on the market in any such quantities as blue grapes; there is a call for a certain amount of red and white to mix with the others for table purposes, but for culinary purposes, Worden, Catawba, or something of that class will lead.

Mr. W. D. Markham: I have been here thirty years and have set a few grapes. When we commenced there was nothing known of any but Concord and Delaware. We set them because they were the most common kinds, and I have had some good grapes and some not so good. I have had some as fine Concords as I ever saw, but the trouble with us, as with most everyone, was that we did not know how. I have improved somewhat, but the fruit is inclined to be sour. I have conceived the idea that Worden is so popular because it ripens early and is sweet. If you get Concord ripe it is good enough. Salem mildews badly but is fine if you can get it. I am somewhat encouraged that we can raise good grapes here, but we must know how to trim, cultivate, and care for them.

Mr. Brassington: Mr. Markham, do you find Worden a tender grape?

Mr. Markham: I have not had much experience in growing it. I think if I were going to start in I would set Worden pretty liberally.

Mr. Rice: It stands our climate at Port Huron, and that is worse than this.

Mr. Burdick: I have found it a good, hardy grape; I do not think there would be any danger in setting them here.

Mr. Morrill: If I were to express an opinion, I would say I believe that the hills of this vicinity, judging from what I have seen in other parts of the state, are ideal locations for grapes, from the fact that there is good drainage, proper character of soil, and exposure to sunshine and air. Everything seems perfect. But this is not the northern limit. In Benzie county they grow fine grapes.

Mr. Reid: Mr. Markham's reference to half-ripened grapes points to a feature in the marketing of grapes that is becoming unbearable. They are rushed into market as soon as they color but before they are ripe, and this injures the public taste for grapes. People who buy a few

pounds of such unripe fruit are relieved of all liking for grapes for that season, and unless something can be done to induce growers to refrain from this practice there will be serious injury to the grape market.

Mr. Morrill: There is a point in connection with that. Your location naturally compels you to select early-ripening varieties. Perhaps that very fact may induce you to plant some such variety as Champion. Our people have planted much of it, but I am very glad it has not been recommended here. In our section, in order to have an early crop, there are many Champions. They are sent to market so sour that it would make a pig squeal to eat them, and by the time Worden comes people have had about all they want of grapes, and the price has been established very low. If Champion had never been introduced, while there are a few who would not have made so much money, the majority would have made more, because nothing destroys the market so soon as inferior fruit, and I hope you people, in your efforts to secure an early grape, will not take to anything like that.

Mr. Brassington: The reason I asked about soil was, that at Catawba Island and various other places I am told they have a shale formation. Especially is that true in France, where they grow grapes. The soil is largely mixed with shale, and it seems to be the soil best adapted to make quality in the grape. Now, of course, if we can not grow a grape here that has quality, it certainly would be worthless as a commercial grape. I see that they have been in the habit, in the French vineyards, of sowing soot or any black substance for the purpose of warming the soil. I suppose that is the object, to get heat.

Mr. Morrill: The Chautauqua grape region is composed largely of shale formation, but we in Michigan grow grapes just as successfully.

Mr. Reid: The Lawton Concords are reckoned better than anything of the same variety produced in New York.

WHEN THE FRUIT IS READY FOR MARKET.

BY MR. EDWARD HUTCHINS OF GANGES.

If any are entitled to feel an honest pride in successful achievement, surely the promoters of our horticultural societies may justly exercise that emotion, for certainly the wide expanse of orchards now growing along the eastern shore of lake Michigan and the large and rapidly increasing quantities of fruit shipped abundantly testify to the efficiency of their work.

But the low prices obtained last season, together with the almost absolute certainty that in five years more production will be doubled, admonish us that we may very profitably devote more attention to methods of greater economy in disposing of our fruit. When manufacturers find their margin of profits narrowed down to near the vanishing point they very naturally meet to consider ways of increasing profits. Fruitgrowers have already reached a point where they may very profitably do the same. Some timorous persons are found even now express-

ing apprehension that peach-growing is already overdone, and that no profits may be expected in this vocation hereafter.

It will be interesting to inquire if this is the case. The total production of peaches in this country last year, throughout the various peach-growing sections from one ocean to the other, was probably between four and five million bushels. These sections are so situated that a comparatively even distribution of the fruit among all parts of the country and outside of this country is easy and natural. The quantity produced would, if evenly divided among the fourteen million families of five persons each, of our own population, give between one fourth and one third of a bushel to each family. Surely people would consume several times this amount if they could get all the peaches they wanted.

A very important point for us to consider is that we are not properly supplying those markets which naturally belong to us, and our Michigan growers are subjected to a great disadvantage on account of this inequality of distribution. Right at home one has only to go a few miles beyond the borders of the fruitgrowing sections to find numbers of people who use no peaches at all. Pay a visit to some farm house and perchance the good wife may set out as her very best, reserved expressly for company, some small, ill-flavored peaches which she has gathered from some neglected seedling tree left to struggle for existence in some fence corner; but rarely will one find any of our fruit of good quality such as we ship.

During the last few years I have occasionally met men from different parts of the states of Iowa, Nebraska, Minnesota, and the Dakotas, who have handled fruit, but in the main what they handle is from California and not from Michigan. Only a few weeks ago I chanced to meet a man who carries on a grocery business in a town in central North Dakota. This man sold some California peaches last season which he received from Minneapolis. That fruit was shipped at least twice the distance from Michigan to Minneapolis and then shipped back west to him. Michigan should supply the greater part of the fruit consumed in all of those states as well as those lying south of them; but it is a fact not greatly to our credit that California is supplying by far the greater part. Until Michigan can successfully contest the ground with California at least half way from lake Michigan to the Pacific ocean, we need not consider solved the question of fruit distribution.

Another matter equal in importance to that of a better distribution of our fruit is that of greater economy in our methods of disposing of it. Probably three fourths of the fruit grown in Michigan has been consigned to commission dealers in Chicago and Milwaukee. Every one acquainted with business methods must admit that this is a most expensive, unsystematic, and unbusinesslike method of disposing of the fruit. The one fact that fruit grown 2,000 miles away is allowed to take such a prominent place in the markets immediately under our noses does not commend the system to us. No other class of business could or would place its pocketbook into the hands of other men without any bond, without any check or means of knowing whether the amount returned corresponded with the sales, and the fact that our fruit can

be thus disposed of and still leave a margin of profit in these dull times is evidence that we have an unusually profitable business. How many lines of business are there that could live under such a system? However, we have grown into this method of disposing of our fruit, and we shall no doubt be compelled to continue in it for the present to a considerable extent. I am not disposed to make war on the commission men unnecessarily, for I believe that they do the best they can with our fruit, as a rule, and they certainly have played an important part in building up our peach industry; but they are circumscribed by such limitations that they can not dispose of our products with sufficient economy to afford us ample remuneration with an output such as we may expect in the future. I will make this charge a specific one.

It has been my practice to mark my better grades of peaches with name and address, the consignments being made to Chicago. This custom has brought letters from commission men in several places to which the fruit has been reconsigned—from Buffalo, Cleveland, Cincinnati, Toledo, and others—asking for consignments to them direct.

Let us estimate as nearly as possible what proportion of the final selling price it cost to market those peaches which we shipped to Chicago and which were reshipped to Buffalo, making our estimate on a basis of last season's prices. We will assume that the average selling price in Chicago was 20 cents per fifth basket, which I think is sufficiently high. The freight and cartage cost 4 cents per basket and commission 2 cents, making 6 cents in all, and our net returns would be 14 cents. The charges to Buffalo from Chicago would perhaps be 4 cents or a little more, and commission 10 per cent., which would bring the price up to about 27 cents in Buffalo. Then there is a buyer's profit, amounting at least to 10 per cent. of the Chicago price, making 29 cents, for we must bear in mind that, even if the fruit was not sold to a buyer in Chicago, but was consigned to Buffalo direct by our Chicago commission house, still they had made their returns to us and they stood in the light of buyers, and as such were compelled by self-interest to make returns to us sufficiently below the probable prices in Buffalo to leave them the protection that a prudent buyer would need.

It appears, then, that on the most conservative estimate we can consistently make, the peaches that netted us 14 cents in Chicago must have sold in Buffalo for more than double that figure. Suppose we had shipped those peaches to Buffalo instead of Chicago. The expenses would have been no greater than from Chicago to Buffalo. On the basis of this estimate we should have saved freight to Chicago, 4 cents; commission, 2 cents, and a buyer's profit of 2 cents, 8 cents in all, or a saving of 40 cents per bushel, over 27 per cent. of the selling price in Buffalo.

Of all the fruit consigned to the commission dealers of Chicago and Milwaukee, only a very small proportion is consumed in those two cities. The larger part by far is sold at points outside, and subject to those unnecessary expenses which I have indicated. From information I have been able to gain I am satisfied that on the whole we scarcely realize more than fifty per cent. of the final selling price of our fruit, and even that price is governed by a comparatively restricted market, the

great section of country that should be using our fruit being largely monopolized by California, as we have seen.

A large proportion of useless expense may be cut off by making Michigan a distributing center instead of Chicago. This may be accomplished to a considerable extent by encouraging buyers to come among us, as is done in some sections now. But I think a most important work would be that of widening our market and commanding all of those important points within our easy reach. This work will necessarily be done through organized means, or it will have to be left to do itself, as has been the case in the past, and in the face of outside competition. The latter method will therefore be as slow of success in the future as it has been heretofore.

There is an abundant and growing need for organization. Even with a general system of disposing of fruit to buyers, the grower is on an unequal footing, as his information regarding the condition of the various markets is only meager at best; and I may suggest that a very important work would be the establishment of a bureau of information having a line of communication with all the important markets, so that the growers could be advised of market conditions daily during the shipping season.

BY HON. R. D. GRAHAM OF GRAND RAPIDS.

I will endeavor to give you a few facts and figures which may bring out a discussion of the subject of transportation. For the purpose of making a showing to the Joint Traffic association of the trunk lines, we have obtained the following estimate of peaches shipped during 1895, by counties:

	Bushels.
Allegan County.....	1,250,000
Kent County.....	695,000
Oceana County.....	250,000
Mason County.....	150,000
Ionia County.....	60,000
Van Buren County.....	80,000
Barry County.....	15,000
 Total.....	 2,500,000

Of this amount, of course, a great many went across the lake by boat, but the Chicago and Milwaukee markets are not giving our growers satisfaction of late years, and in turning our attention to eastern markets we find that the traffic associations discriminate against our baskets, carrying peaches in crates for about one half what is charged for peaches in baskets. Two years ago, by making the proper showing to the Central Traffic association, they were induced to classify peaches in baskets as second class, and give them a correspondingly low rate; but their territory only extends eastward as far as Buffalo, N. Y., from which place we have been obliged to pay a one and one half first-class rate on peaches in

baskets, which practically shut us out of all markets east of there. Following is a list of some good eastern markets, showing the present cost of transportation and what the cost would be with the change of rates:

1st, New York	\$1.08 per 100 lbs, 20,000 lbs per car	\$216 00
2d, "	.62½ " " " " " "	125 00
	(or a saving of \$91 per car).	
1st, Philadelphia	\$1.05 (saving of \$89).....	210 00
2d, "	.60½	121 00
1st, Rochester	.81½ (saving \$68.50).....	160 50
2d, "	.46	92 00
1st, Syracuse	.81½ (saving \$62.50).....	162 50
2d, "	.50	100 00
1st, Albany	1.03½ (saving \$87).....	207 00
2d, "	.60	120 00
1st, Boston	1.18½ (saving \$100).....	237 00
2d, "	.68½	137 00

The above list will show that the difference between the first- and second-class rates is enormous, on the quantity shipped, and there seems to be no reason whatever for this discrimination, as there is not the least difficulty in loading the minimum amount, 20,000 lbs., on any ordinary car, whether in baskets or crates, and besides, many other fruits, such as plums, quinces, lemons, oranges, and bananas, are given the lower rate. It has been said by some that if the rates were lowered in the eastern division, the New Jersey, Delaware, and Maryland peaches would come further west, and that we would be the losers. However, the Grand Rapids fruitgrowers have made arrangements to send a man to New York, who will take a sample of our basket and try to make a showing before the Eastern Traffic association that will bring about a more equitable adjustment of rates.

BY MR. J. J. GEE' OF WHITEHALL.

Three things are essential to successful fruit culture—the man, the location, and the market. Some men, we are sorry to note, were born under an unlucky star. For want of energy or judgment, or from causes beyond their control, failure meets them on every hand. Others fail who have the ability but do not deserve success. Their lack of integrity invites defeat sooner or later. They would never consent to leave a large peach in the bottom of the basket or a small one on top. They remind us of the Jew in the story of the four friends out west. A Baptist, a Catholic, a Jew, and an agnostic were very warm and intimate friends. The agnostic was taken sick, and in his last hours called in his three friends, made his will, each being remembered in a substantial manner, and appointed them executors, each agreeing to carry out all its provisions, one of which was that each should deposit \$200 of his own money in the casket with the remains. In probating the will the Baptist was asked if he had placed his \$200 in the casket. He replied, yes; that while he considered it a foolish waste of money, he had promised his friend in his last hours, and felt bound by his word. The Catholic was

asked if he had deposited his \$200 in the casket. "Yis, indade;" he "niver wint back on a frind, dead or alive," and had put in \$200 in gold. The Jew was asked if he put in his \$200. "I surely did, sir; I put in my check for \$600 and took out the change."

The first element of success, I would repeat, must be the man. He must have energy, perseverance, integrity, and be fertile in resource. The second element, though just as important, is location. This we all know must be generally free from killing frosts.

In regard to location, I am safe in saying that the success attained the last ten years in growing those fruits to which western Michigan has given attention, warrant the conclusion that, with proper care on such locations as can be found in great numbers along this shore, a crop can be secured in at least four out of five seasons. Why these lands along the eastern shore of lake Michigan are practically adapted to the tender fruits is so well understood by my hearers that I need not discuss this feature of the subject. Nor could I add any light to the subject of elevation, air drainage, or soils. Suffice it to say, time and experience have demonstrated to our entire satisfaction that we have an excellent location for fruits, and that many know how to grow them to perfection. With these natural advantages in our favor, and a better knowledge of varieties and how to grow them, of diseases and how to check them, and of the most approved methods of culture, I am certain Michigan has a great future before her in the production of fruits.

But the more and finer the fruits we grow the more important becomes the question of how and when they shall be marketed. The great problem that confronts the California and Georgia growers today is, how to market their immense crops to advantage; and this question demands the best efforts of the best minds in the business, if we hope to reap even fair returns in the years to come.

A friend engaged in fruit culture in California, writes me that he has to pay \$1.34 freight per forty-pound box to Chicago. This means \$1.67 per bushel of fifty pounds. Mr. Hale tells us he pays \$40 to \$50 per car to New York city or Boston from Georgia. This of course is for fancy fruit sold at fancy prices; but we must understand that the bulk of our fruit can not be sold at fancy prices, and, in justice to the millions of poor people in our country, ought not to be.

However, we have the best natural advantages for marketing of any fruit location in the United States. Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin, in which the bulk of our fruit is marketed, and by which we are surrounded, and in which the most distant point of distribution is only about 400 miles from our orchard, had a population in 1890 of 16,685,000, and contain the largest percentage of well-to-do people on the face of the earth. The wealth of this region is more evenly distributed, and the masses more able and willing to purchase the comforts and luxuries of the home. While the population of these states is vast it is also rapidly increasing.

In the February number of the North American Review for 1896, Mullhall, the statistician, makes a forecast of the population of the United States for the census years 1900 and 1910, compared with 1880 and 1890, as follows: Population in 1880, 50,156,000; in 1890, 62,622,000; in

1900, 75,100,000, and in 1910, 90,000,000. The rate of increase claimed by Mulhall is twenty per cent. per decade, which will give the seven states named a population of about 20½ millions in 1900 and 24 1-3 millions in 1910.

This is our home market, and a home market, up to a certain limit, is the best market we can have. This long ago became an American axiom, and it is for us to see if possible that the railroads and boat lines give us such rates as shall enable us to place our fruits at the door of every one of these twenty millions within forty-eight hours after picking.

California has no home market. The whole territory west of the Rocky mountains, an area twice the size of the seven states named above, had a population in 1890 of only 2,690,000. Hence California is compelled to cross vast mountain ranges, a continent, and sometimes an ocean under heavy tribute before the orchardist of that state can hope for reward; and Georgia looks to our northern cities to take her fruit at paying prices. But, unless we can secure vastly improved facilities for distribution, the great natural advantages we possess remain a constant menace to the continued profits of the orchards.

Men in their eager pursuit of wealth remind one of a flock of sheep. Let one take the lead and make a success in any enterprise, and the balance rush blindly after. To confirm this, one has but to recall the California gold craze of '49 or the Pennsylvania oil fields of later date, or the rush for western prairie or northern and southern pine lands of quite recent years; or, still later, the potato craze of 1895. Hence, I would suggest to those who contemplate extensive planting of new orchards, be cautious; only plant what you can care for thoroughly and make into first-class shape. More net money can be made on ten acres under prime care than from forty acres under neglect, and at less risk.

Again, should we not guard against taking too sordid a view of this question? Success in any enterprise that is to engage our time and study should not be measured alone by the standard of dollars and cents. The great artist's success is not determined by the price he may pay for his wonders upon the canvas, nor the author by the market value of his books, so much as by the effect these efforts have upon those who are benefited by them. When the Creator sought the most favorable conditions possible for the moral and physical well being of Adam, he placed him in the Garden of Eden to care for its fruits and flowers. What can be more elevating to the mind of man than coming into close contact with the works of nature in field and grove, where the birds sing, the flowers bloom, and the fields give forth their ripened grain and golden fruits? I have viewed with pleasure and a sense of awe the vast undulating prairies of the west, covered with their rank growth of wheat, oats, and corn. I have enjoyed the variety and beauty of eastern landscape, and of our own southern Michigan, but never can I forget the delight with which I viewed a landscape in this grand county of Oceana. It was in the spring season. In the valleys were spread the dark velvet green of wheat and meadow. The sun had kissed the orchards into leaf and blossom. The hills in all directions were crowned with blushing orchards of peach, in beautiful contrast to the snow-white bloom of the

plum, cherry, or tinted apple that often skirted their lower borders. Nestling here and there among the orchards or lower valleys were the cosy homes of those whose busy hands had wrought this wondrous change of nature, and standing here, there, and yonder were grand blocks of primeval forest that had stood the storms of a century, like the lone pyramids of Egypt standing silent sentinels of the past and present. Here was an inspiration to the poet or artist. Tell me there is nothing in the culture of fruits and a beautiful landscape but cold hard cash! Low and groveling indeed must be the man who can live in the midst of such scenes and not be ennobled thereby.

DISCUSSION.

Mr. Hale: These gentlemen have told us facts that we already know; we would like, now, to listen to the remedy. You people have been growing fruit longer than we, and we would like your ideas on the subject.

Mr. Adams: I would like to ask Mr. Hutchins if there is any plan fixed yet, whereby it will be possible to get very much of our fruit outside of Michigan?

Mr. Hutchins: With us that is, we trust, taking care of itself. Buyers are coming in and taking our fruit; that was the case, to a considerable extent, last season. Some days more than half the fruit was sold outright, and at prices that just about saved us, I believe, the expense of shipping to Chicago. We get about Chicago prices at home, and we are encouraging buyers to come in there. But we are just a little diffident about suggesting remedies. You know, if a man devises a scheme and puts it into successful operation he is declared to be enterprising; but if a man suggests a scheme and it is not put into successful operation, he is a visionary. I have suggested what I consider the best means of solving this question, and that is by organization. I do not see as anything can be accomplished in any other way, but I think, with thorough organization, this matter can be worked out. In fact, I know it can. It may take time, but in our section they have had organization, and they are accomplishing what they desire in a very satisfactory manner. I will say, further, that I would like to see a thorough organization of the fruitgrowers, all up and down this fruit belt of Michigan. I think it would work to our advantage to have our local organization, with headquarters or central bureau, to collect information to ascertain what are the conditions of the market, because I do not think there is a fruit section in the country any more favorably located, so far as markets are concerned, than ours in Michigan, and with proper and systematic work I believe we can reach the markets and can save at least 25 per cent. of the expense to which we are now subject in marketing our fruit. I do not see any reason in the world why we should not.

Mr. T. S. Gurney: This transportation question is a matter that I have had under consideration a number of years, and I am certain that if the farmers of this section, the fruitgrowers, could come together and

agree upon something, we could make some arrangement whereby we could be benefited. Certainly we are just about raising our peaches and plums on shares. We are getting about half, perhaps a third, and I don't know as I blame the railroad companies so much. They are somewhat to blame, but we are to blame also; and before we can ask the transportation companies to help us we must put ourselves in shape so that they can help us. Now, you very well know that a railway company can not take ten, twenty, or one hundred baskets of fruit and land them anywhere and take care of them when they get there. The express companies can, and while a railway company can take care of a barrel of salt or something that won't perish, peaches and plums, when they get to the market, must be cared for, and the railway companies can't do this. Now, last summer I had a practice of putting up my best fruits so that at the bottom of the basket the peaches were as good as on top, with the exception that at the bottom the basket is a little smaller than at the top, and I put my name on each basket; and while I was shipping peaches to Chicago, day after day for three months, peaches and plums, and sometimes to Milwaukee, I kept getting letters from Dayton, South Bend, Canton, and all through Indiana, saying "peaches are worth so much today and are scarce." (About twice what I was getting in Chicago.) "Ship us a carload at once." Well, now, I couldn't do that. I would have been glad to, but you know there is no one grower in this part of the country who has a carload of peaches of his own, that he can ship at once. When I got those letters I would go over to the depot, thinking I could get a nice price at Dayton or South Bend (for the telegram would say the market was high and bare of fruit) and look around. There were growers there with two or three carloads of peaches in the aggregate. I would go to these men and say: "Here, if we can get up a carload of peaches and ship them to Dayton, or somewhere down there, we can get a nice price." "Well, mine are all marked South Bend," or "Mine are marked Detroit," etc., and the result was, mine had to go right along where the rest of them went. We had no organization, we were shipping in the dark. We did not know whether there was a glut where we were shipping, and yet at other places, not far away, there might be an entire scarcity of peaches. I am not disposed to find fault with the railway companies, as I said. If we can put ourselves in a position where we can say to them, "We want you to take a carload of peaches to Lafayette, Ind., and when they arrive there will be a man to take care of them," we can get the peaches shipped at a reasonable rate and on time, and when they get to their destination they will bring good prices. My idea is, there is a remedy for this. I don't blame the commission men. They will not handle your fruit unless you send it to them. If you can be independent of them, you are all right; but so long as you keep yourselves in the condition where you must send them your peaches, you will have to take what they give you. I have in my mind a sort of remedy, but I regret to say I fear the farmers and fruitgrowers are so jealous of each other, have so little confidence in each other, that we never can make it work. We tried this once, and very soon found trouble. But now for the remedy. I would call a meeting of the fruit-growers in the vicinity of Hart. I would form an organization and

have it, if necessary, incorporated, and have a president, a secretary, a board of directors, and a treasurer, and charge each person so much for joining, say fifty cents per year. Produce a little fund in this way. Then I would have the board of directors agree on a business manager, and have it understood that he should do business for all of us. Such a man could go today to any basket factory and save you 25 per cent. on your baskets. He could go to the factory, and say, "I have the buying of all the baskets for that vicinity," and if that factory would not make it an object to him the next one would. You can save money on your baskets. This business manager, with a committee, could go to the railway company and say, "We want such and such rates, to such a place, and if you don't give it to us we will ship by boat." You would not have to draw your peaches to open water more than two or three weeks before the railway company would be down on their knees and give you the rates wanted. (Applause.) We have tried it, and we know. Then I would have the business manager, when the proper time came for strawberries and other small fruits, telegraph around to different places. If I had only five dollars' worth of strawberries, and I wanted to find the best market and I had to telegraph forty or fifty places and pay six dollars for telegraphing, I would not make much. But if I had a hundred men to telegraph for, it would not cost each one more than four or five cents, and all would know just where the market was. Here is another point: the business manager can go to Chicago, Detroit, Lafayette, to any commission man, and say, "I control all the peaches around Hart and Shelby and Mears. They will be shipped to the person I suggest, and we will pay you five per cent. commission and no more. We are going to have a man around here, occasionally, that you don't know, to see how you sell our fruit." If that man would not sell for five per cent. commission, I guarantee that the next man would, and as soon as they find out the power the manager has, the commission men will all be down on their knees, and they will do this work cheap. There is no doubt of that. Then I would have every man put his name on his basket, and nothing else. Just his name and address. I would have this business manager say to these commission men, "When that fruit comes, check it up and see if it agrees with the receipt, and you take out one tenth of one per cent., or one mill, per basket, and send that to the treasurer of this society. Then take out your commission, and send the balance of the money to each party, according to the number of baskets he had. In that way, with the exception of the fifty cents entry fee, if one man had one hundred baskets, and another man 1,000, they would all pay pro rata. This money would go to the treasurer, and whatever you wanted to do in the way of telegraphing or sending to places to see how your fruit was being handled, you would have the money to do it with. I have an idea if you start this in that way, and do it once, you will not only make money, but you will soon drive the commission men to send their men right here on our streets to buy our peaches, as we want them to; and when you don't want your organization any more, you can drop it. I don't believe there is any way of compelling them to come here and pay us for our peaches on the spot, so long as we send them there and let them dole out to us what they see fit. Besides

this, the railway company will be in a position where they will have to accept our terms.

Mr. Hutchins: I wish to say that while this gentleman has, in general, just about outlined my ideas, at the same time he still clings to the idea of letting commission men dispose of our fruit and take off at least twenty-five per cent. of the value of it. I think if you can once get the fruitgrowers organized and get the thing into proper working order, the various markets can be reached direct, and we can save the commission and the expense to Chicago and other points. In other words, make your distributing center right here. Another thing: I don't doubt at all that you can find plenty of commission men in Chicago or any other city who would come here if you could hold out sufficient inducements. It was done at Douglas—I think I violate no confidence in speaking of this. We have an organization there, and we told the commission men we considered a cent per basket for cartage excessive, and we had no difficulty in finding houses that would do our carting for half a cent. That leaked out, and the result was that a large proportion of the commission houses in Chicago only charge half a cent for cartage. We told them we considered their solicitors a nuisance; we wanted the privilege of doing our own soliciting, and we would ship them a reasonable quantity of our fruit, and they might give us the three per cent. they gave their solicitors, and they readily consented to that. When we proposed that, in an audience like this, people said that we perhaps did not know whether we had made the three per cent. saving or not. We don't know what they do with the fruit, so we are not just satisfied that it is the saving we think it is. Notwithstanding that, you see what the organization can do; and further, I think an organization, with the proper machinery, reaching out to these various markets, can induce buyers to come and take our fruit direct—as at Fennville, where there were men from cities all through Ohio and northern Indiana, some from as far as Utica, N. Y., last season, buying fruit and disposing of it in their own markets. Now, I think that is the proper course to pursue; induce the buyers to come here, and then, in order to meet them on equal footing, let us have this line of communication, as this gentleman suggests, so we will know what the markets are, and be prepared to command a market price.

Mr. Morrill: Have you made any special effort, or how did you induce the buyers to go to Fennville?

Mr. Hutchins: I think the great inducement was the low price of fruit. We were shipping eight or ten carloads per day, and they found they could do better with our fruit than at Grand Rapids, although there was one commission house in Chicago that sent a buyer there.

Mr. Morrill: I understand that on an average you received about Chicago prices after you got the buyers to going there. You say you think the low prices induced them to go there; did competition maintain the prices, or did they combine?

Mr. Hutchins: Those fellows seemed to buy the peaches as cheap as they could, and I don't suppose there was any real combination among them, although I noticed they were very friendly, and they seemed to agree on paying about the same price for a given quantity of fruit on

a certain day. Of course, when the market was up, they came up a little; when Chicago market was down, they dropped somewhat, but as a rule they about followed Chicago prices.

Q. But on the whole you found it advantageous? A. I have not yet found a grower who sold to the buyers but is ready to declare that another season he will do the same if he gets the chance.

Q. Is it simply the convenience, and the certainty that you were not being robbed when you took the money home with you, or the fact that you got better net prices? A. I suppose, as a rule, the money satisfied people the best, in any case. It is always gratifying to have something to say about fixing the price. About the time the buyers came in there, peaches were going in Chicago from thirteen to seventeen cents per basket. Of course that narrowed the margin down pretty close with us, and when these men offered us something like those figures, we were sure of that much, at any rate, and that the peaches would not leave us in debt.

Q. They largely shipped away from Chicago, did they? A. Yes, as near as I could learn, that was so. There were one or two Chicago buyers there, but the rest went to other markets. They were buying as high as fifteen carloads per day. At South Haven there were 281 cars shipped east, and I think the greater portion of those that were bought were not shipped to Chicago.

Mr. Rouse: While I agree fully with the sentiment and principle that my friend Gurney offers, I call to mind the fact that two years ago there was just such an organization as that, with a constitution covering all the ground he gave, and the officers were elected and all arrangements made to proceed to business. The members signed the constitution and proceeded to business. They paid in their money, and I would like to know what became of that. Friend Gurney was chairman or president of that association, Judge Russell was treasurer, and I would like to know why that organization was not continued, when it seems as if it would be so profitable?

Mr. Gurney: I would say that there was such an organization, and it is in existence today, and I was president of it, and we have a treasurer, and he has some money (the membership fee was fifty cents), and I was put on the executive committee to draft some by-laws. After we got the by-laws ready we had a meeting and proposed this plan of hiring a man as business manager, and to pay him we engrafted into the by-laws that this man should be instructed to take out one tenth of one per cent., or that the consignee should take this out and send it to the treasurer, to provide a fund to pay these expenses. When these by-laws were put to vote, this part of them met with so much opposition that it, and I guess the whole of the by-laws, were voted down, and the executive committee did not think it best to hire a business manager without knowing where the money was to come from to pay him; and consequently, from that time on, I do not think there were any more meetings. Hence my remark, that I am afraid that the farmers as a general thing would be so jealous of each other that we could not run a thing of this kind successfully, because, to run it successfully, you must have money. Consequently, so far, the organization is a failure.

Mr. Morrill: Do I understand you that the one tenth of one per cent. was considered an exorbitant commission?

Mr. Gurney: I don't know, but the majority of the farmers thought it might be provided for in some other way, and they were afraid more would be taken out, or not accounted for, or something—at any rate, the by-laws were not adopted.

Mr. Hale: As nearly as I can judge from Mr. Hutchins' remarks, the only way is to get the men to go and buy the fruit; and then, he says, the fruit netted just about the same, and I don't yet see the remedy. What Mr. Gurney has advanced is good, if it can be put in practice. I think he is wrong about the parties not being willing to agree to one tenth of one per cent. I think the executive board was never called together to make the arrangement.

Mr. Morrill: There is an organization at Fennville which has a fund on hand. They take a certain contribution out of the shipping of the fruit, and after paying their expenses they have a surplus which they have applied to the mending of the roads. Grand Rapids has also done something in this direction, and there ought to be a way for you to do something.

AN EXPERIMENT IN IRRIGATION.

BY MR. W. S. BURDICK OF HART.

I have been requested to give my experience in irrigation. I would say that what little I have done in that line has been on the surface, and my experience has been rather limited, as I had only a small stream of water to do with and many difficulties to overcome; but, as great doings sometimes grow from small beginnings, I will tell you how I used the stream of water, and it may help others who are like situated.

I had two and one half acres that I wished to irrigate. One half of this was in fodder corn, and we were very anxious to save it, as it was our dependence for feed. We plowed a dried-up meadow on which to plant this corn. It was planted the 18th of June, right in the drouth. It came up, and that is the most it did do. The rest was set to blackberry, gooseberry, and tomato plants. We also had a narrow strip of potatoes, planted by the side of the stream about the middle of May, that I was anxious to irrigate. We had two dams across the stream, one at the head, the other about eighty rods below. The first dam being out of repair, we irrigated the potatoes from the other pond by cutting a ditch at the side of the pond and turning the course of the water and leading it between the rows of potatoes. A few years ago I had potatoes on the same ground that I wished to irrigate, and not knowing just how it should be done I turned the cold water on the plants and kept it there until the plants were thoroughly drowned; but since then I am careful not to let the cold water touch the plants at first, but by leading the water between the rows the warm sand would take the chill from the water

while it was soaking back to the roots. We also wet one end of the fodder corn, but as the pond was small it was impossible to get the water as we wished. We then repaired the first dam (or tried to). We had a wooden spout in the bed of the stream that we thought would answer. We packed in the dirt and left it to fill, which would take about three days. When it was nearly full the water forced its way through by the wooden spout, and out went the water into the second pond, causing it to overflow, and away went water and trout over the potatoes again, which was more than we had bargained for. But it couldn't be helped. We got the trout into "the drink" again as quickly as possible, and concluded to try again. I then got four-inch tile and placed it in the bed of the stream, and built the dam again. When it was full the water was five feet deep at the breast of the dam; the size of the pond fifty by seventy feet. From the second pond we made a ditch across the potatoes, because we were obliged to take it that way in order to get it on the upper side of the corn. The whole distance I wished to take this water was forty rods. I have irrigated from this stream in a small way several years, but never undertook to carry the water so far as I did during the last drouth, and it was a success. Letting the water out of the first pond into the second raised the water and caused it to flow through this ditch, and when it came to the corn, with my hoe I opened this ditch and let the water run down through the corn until the pond was empty. The ground was so very dry that I was obliged to let the pond fill three times before I got the plants well irrigated. The corn, except that which had been irrigated once, was about six inches high, and every leaf twisted tight. This was the twentieth of July. It was a pleasure to see that corn untwist and grow. It changed color almost immediately. The corn that was irrigated twice during the drouth grew to be over six feet tall, while that which was irrigated once grew three feet tall. If I could have irrigated the whole of the corn twice it would have made some difference in the amount of feed. The Souhegan raspberry canes grew to be ten feet long, but as this was my first experience with that berry I do not know but they generally grow that long. Among the rest I had a few sunflowers that went up like Jack's bean, and the stalks were so large my wife advised me to cut them up for firewood. I have turned the water around blackberry bushes after the fruit had begun to ripen, and they were large and juicy. I have also drawn water from this brook up hill, to water 140 peach trees. We dug away the earth from the upper side of the tree, three or four feet from the body, and used one barrel of water for four trees. We did this three times during the season, and it paid. The peaches were larger and of better color than those not watered, but when we have 1,200 trees, and all up hill, it is certainly a piece of up-hill work that I do not care to undertake. I am satisfied that to raise crops and fruit successfully in this sandy soil, it is to our advantage to irrigate in some way if possible. I have endeavored to tell you as plainly as possible how I handled this stream of water. My dams are now in good condition, and if I have occasion to use the water another season I think I can do much better than in the past. Any man who has a stream of water on his farm can do as well as I did, and I hope better.

DISCUSSION.

Mr. Morrill: Such seasons as the last two make people wonder if there is not some way of getting the water where it will do some good.

Mr. Rork: I have had no experience in artificial irrigation, but I like to study nature. I am not sure, sometimes, but she is a better teacher than any of us. She has a method or irrigating and a method of mulching and of fertilizing, and that is, by means of the snow. The question of the water supply and of irrigation is upon us. Much of our water supply is lost, when the snow drifts into the ravines and streams, and melts while the ground is frozen, and runs to the rivers and lakes. We did not have so much dry weather when we had plenty of forests, and the snow brought plenty of ammonia, and we grew fat. Now our forests are gone, the wind blows off the snows, and we lose the benefit of them. Some of us, up our way, have organized a forestry committee, and we propose planting trees, shelter belts, along our farms, that they may catch the snows and save them. I was in Minnesota once, where they could not dig deep enough to get water, and when they dug they got rocks, so they went to work to save all the snows. I think in this country it stands us in hand to save the snow that falls on our fields, if we can. In my judgment there is no one thing that will do us any more good than to save our snows.

Mr. Monroe: Mr. Burdick, how large a tract can you irrigate by the method mentioned?

Mr. Burdick: I had five or six acres irrigated by having all the water run down hill.

Q. How did you manage about the sand? A. I prepared my ditch. At first I let the water run slowly, and went along as the water was running. I took my hoe and puddled the ditch, and when I got through the water would run in the ditch without soaking away much. I have heard it argued that we could not carry the water over sand. I can carry my water a hundred rods, and carry it all the way on sand.

Mr. Rice: We get rather curious ideas someway. Today I was told that I would have to cut down the timber on each side of my orchard, to keep the frosts off, and now I am told to plant it, to keep the snow on.

Mr. Morrill: Try both.

Mr. Hutchins: I know of two or three places that were surrounded by timber last season, with substantially the same conditions that he suggests, and they were the only ones I know of that were injured by frosts. It makes the temperature a little warmer, advances the buds, and brings them along so that they catch the frosts. I think, after the gentleman has had a little experience, he will conclude that it is better to lose the snow.

Mr. Rice: I think I will cut away the timber and sow oats, and let them stand there to catch the snow. I didn't like the idea of going to work and planting the timber, when I have it cut down.

Mr. Rork: I did not suppose you would plant a forest.

Mr. Morrill: There is a difference, as you say, Mr. Rork, between a shelter belt and a forest.

Mr. Rork: It does not answer to base very much of an opinion on a single incident. Now, this year, north of us, near Grand Haven, where the bluffs are high and there is fine hardwood timber, it has always been frosty, and as a rule, under those bluffs, they are several degrees colder than we are, but this year they went scott free and we froze. I would rather have a covering of snow than all the ditches there are, unless it is a big one, like the Mississippi.

Mr. Burdick: My pond and ditch are in a valley. The snow comes from the hills and drops in there, waist deep, frequently, and I find that when we have a drouth that pond and the ditches come in exceedingly well. It is a pleasure to have ten or fifteen thousand barrels of water stored up to use in dry times. A thousand barrels will give you $1\frac{3}{4}$ inch rainfall for an acre, so you see it does not take a very big reservoir or pond to irrigate an acre. If you will use a cultivator or Breed weeder it only takes a little water, rightly applied.

Mr. Monroe: I think that this is one of the questions about which we need to be pretty careful. We have had such glowing pictures of this irrigation question, presented in different parts of the country, that we are likely to over-estimate its value. I know there was no one thing in the west in which I was more disappointed than that matter. I had read quite a number of pamphlets on the subject, and I remember, when we were in California, the glowing picture presented as to the advantages of irrigation. Work was not interfered with at all; when they got ready for water, and the crops were ready for it, all they had to do was to turn on a faucet. We had a very pleasing picture of the easy manner in which water could be supplied, but when it came to the actual facts it was greatly changed, and I am satisfied that we are likely to grow enthusiastic over the matter, and to spend a good deal of money foolishly in irrigation; for, with my observation (and I tried to look into the matter thoroughly), I doubt whether in that western country they can irrigate much cheaper than in this state. At the Agricultural college they put in a plant, as a part of the experimental work, with a view to testing the matter carefully, and as the ordinary farmer or gardener would do. It covers something like nine acres and is under the charge of Prof. Taft, who has had wide observation in regard to irrigation plants. He took special pains in California, last year, in looking up the various methods of distributing the water, so as to know in dollars and cents, as nearly as possible, just what it costs for the various crops. There are a number of places around the state where they are making these tests, and I think it is one of those things about which we should take a second thought. We should let a few people experiment, and watch the effects of their experiments so as to get the benefit of them. I may say, further, that over at the college the intention is to carry that along from year to year, so that we will know exactly what it costs, and just what the returns will be from different crops. My attention has been called to several cases where parties are putting up windmills, and have bought traction engines and are putting in considerable piping, and it is very clear to me that it will be a losing job. We had a case at our place, that of Mr. Stearns. He has applied it in as inexpensive a way as possible. He buys water of the village, draws it in barrels, and puts it around his trees. Mr. Stearns is a practical man, and he is entirely satisfied that

that method of applying water pays him, but he has no expensive machinery to go to pieces. There are simply these barrels.

Mr. Rice: I don't know but I am a little prejudiced against snow. I was brought up in Wayne county, New York, and there we have snow from early November to May 1, and all my early life was spent digging through snowbanks in the winter, or wading through them, trying to get to school; and still, in that same country, we used to be troubled with drouth. Our corn used to dry right up and we were troubled greatly, and I don't believe the snow will carry you through the drouth of summer. I think it is necessary to cultivate thoroughly. At every one of our meetings we hear people tell about how the rainfall is less than in years ago. I think that idea should be exploded, and I chance to have here in my notebook memoranda made some time ago, that the lakes, in 1819, were within seven inches as low as in 1895. There is the dredging out of channels, etc., to lower them. The amount from 1880 to 1895 is only three inches; and you may remember that at our meeting at Adrian an old settler told how the marshes and rivers there were so dry, in the early days, and that it was not so dry here, even this year, as it was sixty years ago; and I know in our part of the state, we suffered more from the drouth in 1858 and along there, than in late years, since the country has been cleared. Then it was all woods.

Mr. Morrill: In company with a few other gentlemen, this winter, I visited an asylum for insane at Kankakee, for the purpose of seeing how it was run and to see the irrigating plant they had put in. They have 3,500 insane patients to feed, and there are 1,200 acres occupied by the buildings, farm, and garden. The garden occupies ninety acres, and this is irrigated and a careful account kept. It is as systematic an institution as there is, perhaps, in the United States. In 1894 the garden showed a loss when the produce was credited for its value. The superintendent decided to put in an irrigating plant. The soil is excellent Illinois prairie land. They had a pumping station, of course, for the institution, and they simply added the pipe to that and had the Kankakee river to pump from. The results, as shown by their books this year, were wonderful. It not only paid for itself, the whole plant (and this was surface irrigation), but for all the help employed, and left a nice margin, and the produce was cheaper this year than the year before. There was an instance where they had plenty of water and plenty of money to put it into operation. They sent to Colorado and got a skilled irrigator to take charge of the work, and they flooded at the rate of six inches of water at a time. The first thing they did was to lay tile under the land. That tile had not run for two years, and this year they kept it running quite a large portion of the time, by the water on the surface. We might infer from this, that it would be profitable for us. It might be, if we had the money, location, and water, but when we as fruitgrowers attempt to talk about irrigation, we must recollect that we are located on hills and rolling ground, and practical irrigation is absolutely impossible with us, except for limited areas. The idea of pumping water on these hills would hardly be a practicable one, I imagine, and I think the only practical irrigation, for the majority of us, is better tools and cultivation, and the conservation of every drop of moisture that falls.

HELP ON THE FARM.

BY PRESIDENT MORRILL.

I have had considerable experience with hired help. I keep a good many men, and there are some things which I think I have learned, and I will speak on those lines. I think we should get it pretty fairly impressed upon ourselves that labor is a commodity and nothing else. It is something that it is necessary to have in order to run our places successfully. We have to go into the market and buy it. When we find a man who owns labor, and we propose to exchange money for it, it is his commodity, and about all we have to do with him or her is to receive that, and his obligation is to deliver it in the proper manner. I think many of us who hire help are essentially wrong in one idea we have, that when we hire a man we own the man, when we hire a girl we own that girl. That is entirely wrong. So far as we may know, they are our equals in every respect, and should be treated as such until they prove unworthy. There is where many of us fail. There is no sentiment in the matter; I believe it is a matter of bargain. If a man wishes to hire to us, we often hire him on his own recommendation; perhaps he furnishes one from the last employer. After that, we have to do with the labor he delivers, and if he is worth the money he is entitled to it; if not, he is not. We have also to do with the manner in which he delivers his labor. He must be our associate to a certain extent, and many times he is a member of the family, practically; then there is an obligation resting on him as well as on us.

I am sorry to say that a great many men have a wrong conception of their duties in a family. It is very unfortunate that we have many young men in the country really not fit to take into our families but who get in through this method. In the city they hire a man simply for his commodity, and the manner of delivering it is not so important, and they can use a class of men not good enough to go on a farm. I mean morally good enough. But in that matter many of us make a mistake. We sometimes hire a man whom we know to be unfit to come into contact with any family, and we perhaps take him among our boys and girls. Many of these men are profane and uncleanly in their habits, and many are even worse. But there are many others, good, exemplary young men, perhaps not so polished as others, but morally clean and all right, fit to take in any family, and they are often not appreciated. It is a matter of fact that the young man on a farm, in many parts of the state, who believes in wearing a white shirt when off duty, who never uses bad language, who does not chew tobacco, who is not a little bad at times, is far too often regarded as not much of a man, anyhow. If that young man has good strong sentiments, he is not going to associate very long with the lower class of men, or in families where those things are not appreciated. He is going to drift into better quarters, and he ought to. There are many families who are careful enough of the men they hire, but on the

whole there is gross negligence in that respect. If a man who was unworthy understood that he could not get a job—I don't know, but I think he would either go to the penitentiary or would reform, and I believe it would be well to put him to the test. But so long as he is all right, so long as he is a worthy man, in our farm life as it is at present conducted he should be treated as respectfully as your neighbor by yourself and family.

In turn, he must do the same. If there were very many young men present, I would like to say a word to them. I recollect a piece of good advice I received when I was working by the month in Missouri. An old gentleman I worked for was appointed circuit judge, and we fell to talking of the relations between the hired man and his employer, and he said: "Well, I can tell you how you can always have a place. If you are smart enough to make a man believe that he can't get along without you, you will always keep the place as long as you want it." That is a very simple proposition, but it is noticeable that the young man who, when he starts in at a place, no matter what he has agreed to do for a price, goes through and does that exactly, whether he is satisfied or not, does his duty and works for his employer's interests, is sure to have a place if there is one in the whole country. Don't think for a moment, young man, that you are not understood. If you are on the farm of a man who has been in the habit of hiring men right along, the little traits of character have become well understood by him; if you are occasionally "making a sneak" or doing something you would not do when he was looking, it will show up. A man who has had any experience knows what a day's work is, whether he is on the ground or not. Men capable of hiring men and making money usually have a means of knowing whether a man is doing his duty. He may not tell you, but generally you will find a man of that character, when he sets a man on a job, he knows what he should accomplish. You can go away and leave a man and come back, and you have tab on him, the same as the night watchman's signal in the large buildings. Now, most farmers have some system whereby they keep tab on the hired man. He may, in the rush of the season, put up with a great deal; he may not be willing to discharge the man, because he can not put his hand on another, and he will make the best of a poor thing; but you can depend upon it, he knows all about it, he has you "spotted" for a lay-off, and when the time comes that he can spare you, and you haven't got him where he thinks you are indispensable, you go. But the moment he sees that you have a disposition to push things when they need pushing, and to earn the money you agreed to earn, he is going to keep you as long as he keeps any man, if the other essentials are present.

A young man has no business to start out in life on the farm without a little style about him. A young man who comes from doing the chores in the morning, from the barn to the house, in an unclean condition, and sits down to his breakfast in that way, is not pleasant to any woman. It is a very unpleasant thing, and a little thought will tell you how to get rid of it—just a little attention to cleanliness, perhaps a little change of clothing. Some men are smart enough to keep a different suit of clothes in the barn, and leave the bad smell with the clothes. It is

not necessary for you to soil the carpets when you come into the house; there is a way to clean your feet. It is not necessary, because your work is of a character that often leaves you dirty, that you should go unbathed. I am giving a plain talk to plain people, but many of you know what I am talking about. Many forget it.

Now I will say a word to the men who are hiring. There are a variety of ways in which you can get the worth of your money. It will never pay you to maintain an armed neutrality with your men. You may be able to get along with it in that way a short time, but the moment you are not satisfied with your man and he is not satisfied with you, you would better excuse him or have a peaceable settlement and quit. It is hardly worth while to quarrel, but the moment you arrive at that stage, you know it. I don't suppose there is a man in this room but, the moment a man on his place is dissatisfied, he detects it. Instead of forcing that man to do anything, have an understanding with him, then and there, because a man with that disposition often does you damage, and if you have other men he is certainly a mischief-maker. Consequently, in spite of the fact that you hired him for a set term, come to a conclusion with him and excuse him.

There is a good deal in knowing how to manage men. If you are hiring many you will know it to be a fact that many good boys and men will become thoughtless and perhaps lag a good deal, through story-telling and visiting, and thoughtless things. Oftentimes a little plain talk with him will "square up" a good man. Another thing I have found very useful is to have some one man that I can depend upon made foreman, and practically hold him responsible for the work when I am not there. A great many of our most energetic farmers feel that they can only secure the best results by leading their men, doing as much work as any man on the place. I have always felt proud of the ability to do it, but for many years I have found better results by walking behind my men than by walking before. The man who leads his men is likely to encourage them to do a little shiftless work to keep up. Now, I would much rather have the opportunity to walk around behind my men and see that the work is done well. I can make them understand that they have a job, and that at a certain time they will be through with it; and if a man isn't doing as he should, show him kindly; I have in this way little trouble, though every year there are men who will shirk, but we get rid of them, and better men take their places; and saving the best and sorting out works very well.

Now a word about girl help. This is said to be a national problem, and consequently I will not attempt to solve it, but I think much could be done toward making their lot a little easier. We should provide what we can for their comfort; keep them well supplied with water, with dry wood, and a number of little things—carrying out slops, and little things like that. If you stop to think, you are asking your hired girl to give you many more hours than your men. The system is wrong. If you get a good girl don't, because the scale of wages through the country is a dollar or two per week, refuse to pay her what she is worth; and then, if she occasionally wants a little time on Sunday, and if she is pretty good-looking and some of the young fellows like to see her occasionally, you must not object, if she is moderate in that line.

But, of course, sometimes they get so that they can't stay with you; and then have no armed neutrality, but a plain understanding, and then if one doesn't care to stay, hunt up someone else. Sometimes I don't think we manage those things quite as well as we might.

What if we haven't the ability? Well, as a rule, a man stops hiring and tries managing himself; but as a matter of fact, even though farming is at a low ebb, if there isn't anything in hiring help there isn't anything in farming. If I can't hire a man who can make me a dollar per day I would better earn the dollar and have a sure thing. If I can hire one or two men and make a little on their labor I would better have twenty if I am able. Of course, we have to creep before we can walk, but in my opinion a man who works steadily for a fixed purpose, and lives carefully, can accomplish most of these things.

It requires careful handling; and above all, treat labor as a commodity, and good men, when they are working for you, and good girls, as your equals. I understand that, in cities, society does not propose to take hired girls into the family, as a member of the family; but on farms, it is different. We do, we are plainer people, the requirements of society are not so strong, the conditions are different, and they often are our neighbors' girls who feel the necessity of going from their homes to earn a little money, and they are our equals.

DISCUSSION.

Mr. Rice: I think there is one point that ought to be emphasized, in regard to young men and young ladies; and if we would encourage it, it would make of them better men and women—and that is the habit of saving money. It don't make any difference what amount you are working for, it is better to wear cheap clothes and save up a little money. I know that a boy feels better when he has \$5 laid away than when he hasn't a cent, and it is better to lay it away than to spend it on tobacco or candy or anything like that. The indulging of the appetite in these little things leads right on to drunkenness.

Mr. Morrill: O, let them eat candy!

Mr. Rice: Let them indulge in these things a little, once in a while, but when one can't pass a candy store, by and by he won't pass a saloon. Then go on and save, and when a boy has a hundred dollars he will begin to straighten up and he will do his work better. Don't read trash; read good books, go to church, be respectable in every way.

Mr. Morrill: Let them be boys and girls while they can. They are never going to see as much fun again, and a certain amount of fun is necessary. The idea of giving advice is all right, give them all you wish to; but I want to see a young man have a good time, within legitimate bounds; and if he does spend a little money seeing the world and rubbing against people, it is all right if it is legitimate. I wouldn't give a cent for a boy who wouldn't take a girl somewhere and treat her as nicely as his means would permit. I wouldn't have such a boy around. I don't believe a man can be fairly "squared up" and rounded out if he doesn't have some amusement. Let him keep within his means. He will sober down

after a while. There is a time to play and a time to work, and when the time comes to play, let them play.

Mr. Rice: Let him save his money outside of that.

Mr. Morrill: I believe the time comes through middle age, for men to save and make money. Let them enjoy animal life, while they are young, enjoy property-getting through middle life, and enjoy the savings in the latter half of life, and not make it a prime idea to hoard.

Mr. Rice: Did you ever know a man who didn't save money before he was thirty, who ever had any when he was sixty?

Mr. Morrill: O, you are asking questions now!

REPORTS OF DELEGATES TO MEETINGS OF OTHER SOCIETIES.

BY MR. L. B. RICE, TO THE ONTARIO SOCIETY.

Your delegates, appointed to attend the annual meeting of the Ontario Fruitgrowers' association, at Woodstock, December 13 to 15, 1895, were very well received by the association, and a very kindly feeling seemed to develop among its members toward our society. The copies of our Reports which you sent, were distributed among the officers and directors of the association, the officers of local societies, and persons interested in the work, and were very gratefully received.

We found a large association made up of bright and earnest workers who are thoroughly interested in developing the fruitgrowing interests in every part of the province of Ontario. The association has a membership of 2,472, an increase of 378 over last year. The gross receipts from membership during the year were \$2,477.47. This, with \$2,000 given by the government, makes the snug sum of \$4,477.47 to use in their work for the year.

We were interested to know how so many men, representative fruit-growers from all parts of the province, had been brought together in this work—men from the Detroit river to the St. Lawrence and the Ottawa, and from lakes Erie and Ontario to Georgian bay, all united as one in this great work. On inquiry we found that the province was divided into thirteen districts and a good, practical fruitgrower chosen from each district as a director. Each director brings in a report of the work done in his district, and of the variety of fruits peculiar to its climatic influences. While the range of climate is great in Ontario, from mild in the Niagara and lake Erie districts to very cold in the Georgian bay, Ottawa, and St. Lawrence districts, all are fostered and encouraged in their work by the association. The membership is also increased by the valuable monthly published by the association, edited by L. Wolverton of Grimsby, and furnished to each member, this alone being worth the membership fee; but in addition each member is furnished with the annual Report and a share in the annual distribution of plants from the experiment stations. This gives them "value received" even though they can not attend the meetings. The membership has also been increased by one of the directors who has been employed to travel and hold meet-

ings or otherwise interest the people and solicit new membership. For this work he received thirty per cent. of membership fees he collected.

The provincial government has also done much to develop the agricultural interests of all the provinces.

The Hon. John Dryden, minister of agriculture, was present, and in the course of his remarks said of the association: "You now occupy a more prominent position in the minds of the people than at any time in your past history. I am glad that such is the case. Just now, in the depressed condition of many departments of agriculture, there is no branch that is more attractive or presents greater possibilities than that of fruitgrowing. It has become clear that certain portions of this province are peculiarly fitted for production of the finest fruit. Some localities are especially adapted to plums; others, not being equally good in this direction, are admirably adapted to the production of the finest quality of apples, while in almost every section small fruits grow in the greatest luxuriance. The first thing needed by those starting in this industry is definite and accurate information. Naturally they look to an association of this kind, in whose ranks are found the oldest and most experienced fruitgrowers, to supply this need. May I remind you that it is in order that you may be conditioned to accomplish this, that the legislature gives you your annual grant? It is not merely that you may help each other, which is in itself commendable, but that through you the masses of our farmers may be educated along this line."

Prof. Saunders, in charge of all of the experimental stations in the dominion, gave a brief synopsis of his work at each of the five main stations. The central is at Ottawa; the eastern at Nappan, N. S.; one at Brandon, Manitoba; one at Indian Head, Northwest Territory, and one at Agassiz, British Columbia. Much of Prof. Saunders' address was of detail character, therefore intensely interesting to the delegates. At the farm at Nappan there are under test 288 varieties of large fruits, 75 of small fruits, and 279 of ornamental trees and shrubs. Fruits which have been regarded as impossible to grow in this climate have been successfully cultivated and a trade in them made profitable. At the farm at Ottawa there are now under test 788 varieties of large fruits and 604 of small fruits. At Brandon no success had been met as yet with the larger fruits, although 241 varieties had been tried. Small fruits had done well. At Indian Head several of the most hardy crabs had been tried but without success. Only a few varieties of sand cherry, and as yet none of the native plums, have been successful. Currants, gooseberries, raspberries, and strawberries, all yield abundant crops when not too dry. Of the trees, box elder does best. Mr. Saunders has hopes for all kinds of fruit at Agassiz. He exhibited fine specimens of Cranberry pippin grown at that station. Prof. Saunders has done a great work at these stations in the development of fruitgrowing in high northern latitudes. He has demonstrated for us that some varieties of the larger fruits, and most varieties of the small fruits, will succeed in a climate as severe as any portion of this state, the upper peninsula not excepted.

He is so earnest in this work that I should not be surprised at any time to hear that he had started an experiment farm over in the Yukon valley or on the south shore of Hudson bay.

Prof. John Craig of the central station at Ottawa, in connection with his interesting talk, presented charts giving date of the first blossoms and of the full maturity of the pollen of different varieties of fruit grown at different stations. This report is of great value to all planters as an aid in grouping varieties for more perfect pollination, and is worthy of careful study.

The government's assistance in spraying will have a tendency not only to instruct the farmers but to show the benefit of the work. Three complete spraying outfits, with men and teams, were arranged for different parts of the province of Ontario, and placed in charge of A. H. Pettit of Grimsby. He divided the province into three sections and then selected ten orchards in each section that were a fair average, and sprayed as many trees in each orchard as could be covered by one barrel of the mixture, making the rounds once in twelve days. He sprayed each orchard five times. First, before the buds had started; second, just before the blossom opened, and three times after the blossoms had fallen. Farmers from quite a distance gathered to witness the work at each place. Some thirty different counties in the province were visited in this way, and the results were eminently satisfactory.

In conclusion let us briefly look at some of the lessons that one might learn from these Canadians. The division of the territory into districts and giving one director to each district would seem to be worthy of imitation. This would necessitate a larger number of directors than we now have, but would not the work be made of greater benefit to all parts of the state in proportion? It should be not merely to help ourselves that we gather in these meetings from time to time, not merely to build up the fruitgrowing industry in the most favored fruit belt in the world, but to help those not so favored. In other parts of the state they are looking to us and demanding our help. While all can not grow the finest of peaches, yet some variety of fruit may be found adapted to almost every locality, no matter how sterile the soil nor how frigid the climate. It may be apples, plums, and pears, or where only the small fruits may be grown with success and profit. It ought to be our province to help the poor man, the hardy pioneer of our forests, in his log cabin, with his few acres of clearings. He needs our help. It is as important to tell him what to plant and how to plant it to produce the greatest comfort for his family, as to give so much attention to the development of commercial plantations. He is not able to come to us, so we should reach out after him.

Draw a line from Detroit northwest to Ionia, and thence to the north line of Oceana county, and what representatives have we in all of that part of the state east and north of that line, and what are we doing to counsel or encourage the immense fruitgrowing interests of that, the larger, part of the state?

A few years ago the so-called "Thumb" produced immense crops of the finest apples, plums, and pears. Under this stimulus large orchards have been planted. Peaches have met with but one failure in several years at the lower end of lake Huron. Above Saginaw there are thousands of acres that are but "jack-pine lands," that are fertile and have proved to be well adapted to apples and plums, especially the latter.

One man in Oscoda county, Samuel Hill of Leinster, planted 4,000 to 5,000 trees, apples and plums, and they are reported as doing well. These fruit lands are found all of the way north through Alpena, Presque Isle, and Cheboygan counties. Even in the northern peninsula apples and plums are being grown to some extent, and small fruits thrive everywhere. Why may not the Green bay country rival the apple and plum orchards of Georgian bay in Canada? May I ask, what are we doing to help these people? Their only instructors are the "tree peddlers" and the hard knocks of experience—either alone bad enough. The corn belt is said to be moving northward. Why should not the fruit belt be governed by the same climatic influences? It is acknowledged that the further north the apple can be successfully grown, the better the quality of the fruit. Why, then, should we not help to develop the possibilities of the northern part of our state? Is there any good reason why we should not imitate our Canadian neighbors and divide all of this outlying territory into districts and invite them to name an earnest, wide-awake man, interested in the encouragement of the fruitgrowing industry in his locality, and give him a position of director in our society?

BY MR. C. J. MONROE, TO THE WESTERN NEW YORK SOCIETY.

Mr. Rice, in reporting on the Ontario convention this forenoon, gave you a very good idea of the activity of our Canadian neighbors in matters horticultural. I refer to this to remind you that this is also the case in every state in the Union, where fruit can be raised, and those of you who attended the World's Columbian Exposition will remember how the western states, away up to the border line, were in the fruit business.

When I went down to attend the New York convention, among the things I felt particularly anxious about was to try to bring back, if possible, ideas and suggestions that would be helpful to us. It seems to me specially important that we improve every possible opportunity in connection with the raising of fruit and its marketing; and in visiting a society like that of western New York I think we all appreciate that we are going right to headquarters. It is a section of the country where dwell the authorities on the fruit business, where the largest amount of capital is invested, and where they have made fruit-raising, I think I am safe to say, a more legitimate business. Perhaps I can best illustrate my meaning by contrasting it with California.

It was my pleasure last year to visit California and attend a meeting of the American Pomological society. The address of welcome was delivered by a man who promotes the establishment of all societies, and who perhaps knows very little about the practical part of the work; but he certainly knew how to picture California in such glowing terms that every one who heard him wished to be a Californian. The exhibits were largely made by large companies, railroad companies and others. We were shown about the state by that class of people. In other words, we were constantly impressed with the feeling that they were in the fruit business to sell land, rather than fruit; and yet, I almost hesitate to make this criticism, for if there are any people in the world who know how

to treat you so generously and liberally as to disarm criticism, it is the Californians. There are many things we should imitate.

But when we go to a meeting like the one in New York, we meet people who come right from the farm and orchard. They make their living by the fruits, and are in the business to get a living by what they produce from the ground, not by buying or selling the ground itself. They have commenced by small beginnings, and have come to be, in some cases, large fruitgrowers; and yet western New York represents the great mass of small fruitgrowers. I know of scarcely a meeting where there seemed to be greater enthusiasm than at that meeting in New York. People manifested, by their interest and questions, that they were there to learn more about their business, and that they believed they had as good a business as there was in the country.

Another feature that was particularly gratifying was the presence of a large number of old men—men whose memories reached back fifty or sixty years, who have been in the business all those years; and a still more gratifying thing, in connection with this, was the large number of young men who were there, and the way in which that society is undertaking to encourage the attendance of the young men. A great many of the fruit farms of western New York are represented by the third generation, and some of the principal men are able to give their sons college educations and travel, and the sons have improved it. It is gratifying to know that these sons, who have education, ample means, and the observations gained by travel, are following in the footprints of their fathers.

There were sixty or seventy of the boys from the body of agricultural students at Cornell university, who were brought down there to attend that meeting. Attention was called to the fact, and Prof. Roberts invited the members to meet these young men at the hotel and hold a reception. His idea was that these young men might have a chance to meet the president and secretary and other officers of the society, and the visitors, and to impress upon the young men the importance of attending the meetings regularly, that they might get the advantage of the practical discussions. It was my pleasure to return with these young men to Cornell, and the next day, after reaching there I happened to be in the mechanical department, with one of the professors, who was formerly here in Michigan. I said to him that it was a very gratifying thing to me, to see those students down there enjoying and endeavoring to get the advantage of the meeting, and then I reminded him of an experience I had in California. I don't wish to criticise too much, in that direction, and yet there is a valuable fact in connection with it. I visited the Agricultural college at Berkeley, in California, and while there I was looking for the agricultural department. Not seeing any one about, of whom I could inquire, I went to the literary building, where there were fifteen or twenty young people, and I said, "I would like to know where I can find Prof. _____," and one of them replied, "I think you will find him over at the 'cow college'; and before I got to that department, as many as three persons, in speaking, referred to it as the 'cow college'." What is the effect of that? There is an agricultural college connected with the university, but the fact is that there were something like a

dozen students in the agricultural department. The rest were all in the literary department. Those young men were there because they were determined to obtain an education along agricultural or horticultural lines, and they cared nothing about the twitting.

I remarked that I was glad to see there, at Cornell, that the agricultural department was recognized, and he replied, "Why shouldn't it be? There isn't any other department where they would be likely to be taken out for a two-days junket, where they go to Rochester and take part in the meetings of the society." The point I wish to emphasize is, and it seemed to me a grand thing, that they were seeking to magnify the horticultural and agricultural department of that institution, and in line with this, it seems to me, is the fact that we ought to give more attention to getting our own young people out and interested in these meetings, and in the common affairs of life; not only the farm, but the orchard and garden. That was a very pleasant feature of the New York meeting.

Another feature I wish to note, is the matter of exhibits. That is something we have frequently talked of and sought to encourage here. There they had a room about half the size of this, the tables in which were filled brimful of fruit. There were grapes and pears and apples; about two-thirds of the room was taken up by a general exhibit; then the experiment station at Geneva, N. Y., occupied about one third of the room, and had about eighty varieties of fruit, and the pleasant feature of that was their perfection—not only of form, but their entire freedom from scab or worm or defect of any kind. These teach lessons, it seems to me, and lessons of very great importance; and not only has the society sought to encourage it, but I think it is one of the things the people ought to take up locally, and at every gathering of this kind we should bring out as much of an exhibit as possible because of the value of object lessons.

In line with this was the matter of implements. There was an excellent exhibit of pruning shears; and to show you how much the people were interested, there was hardly an hour but the president had to call attention to the noise that was made in those rooms where the fruit exhibits and the implements were.

One man felt that his spray pump was not satisfactory, because it had ceased to work, and when he got hold of an expert it was found that sediment from the lime had gathered and stopped the pump. The men who manufacture these articles arrange it so that you can have some one explain every part, the various uses and the various ways of keeping them in motion. The perfection of the fruit from the experiment station at Geneva was caused by frequent spraying, and thereby that feature was emphasized.

There is one other matter I wish to mention. There are so many things connected with a society of that kind that one hardly knows what is most important, but I wish to say a word or two in regard to marketing, because that follows right along and becomes specially important in view of the large amount of planting that is going on all over the country. Along that line, I will mention briefly that it seems to me that a very large increase in the use of fruit might be encouraged at home. It is a fact, and I suppose has often been mentioned here, that one has to pay

the foreign price if he buys fruit at home. There are people all about us who would like to use the fruit if they could obtain it reasonably. The grower says, "Here are my returns." But what does that include? The cost of the basket, packing, marketing, etc., almost half of the total cost. Now, with us, we have very largely increased the home consumption, because a few people were willing to sell fruit without all of this work, and give the buyers at home the benefit of it. We encourage the farmers around the country to come in and buy, and some people have taken it up as a business, and run wagons around the country. They go down into the fruit sections and back again into the farming country.

Grand Rapids is taking the lead in this matter of shipping out to other states. In connection with that, I desire to state the fact that they are doing away with a lot of the dressing and fussing that costs so much. They are shipping in open bushel baskets. For years that has been done in the east, but you know how careful we have been to cover the fruit with tarletan, etc. In Grand Rapids they have induced the railroad companies to shelve their cars, so that a large share of the fruit goes just as it is packed in the orchard. Just see the advantage in the economy of shipping in that way. This very year we disposed of about 600,000 baskets in that way, in our own town. The only misfortune was that we had to send them out in fifth baskets, and much time and expense were lost in that way.

Being interested in a bank, I have a chance to look over the checks, and I believe the shipping to so many different men is a misfortune. We have men in our own community who are not large growers, who during a season will ship to a dozen or fifteen different men. Now, that is perfectly suicidal. The fact remains that there are some honorable men in the commission business. The understanding between the fruitgrower and the commission man ought to be as perfect as it is possible to make it—as much so as if they were partners in a local business.

Some years we must depend more or less upon the Chicago market, and the thing to do, for those who are shipping to Chicago, is to settle upon the man there who seems most satisfactory, and then, if possible, induce that man to come over to your place about picking time, take him to the orchard, and let him see how you are raising fruit; let him go into your packing shed, make him just as familiar as possible with your ways and methods of handling. Then go over there and visit him, and just in proportion that you can establish the relationship with your commission man that President Morrill and others have maintained, who have always confined themselves to one man—if you will follow this advice, which is not a matter of guesswork but of ten or fifteen years' observation, you will find that you will gradually increase your profits in consigning to Chicago, and have a good deal less complaint to make about the commission man.

BY MR. R. MORRILL, TO THE ILLINOIS SOCIETY.

Mr. Morrill: The next report should come from Mr. Hamilton, of Ganges, but he is ill, and as I was there with him I will make a brief report. Previous to that, with Mr. Monroe's permission, I will supplement some things he said of the New York society. I was there also, and last year, as well; and, not even excepting Michigan, it is the brightest and best society meeting I ever attended, and I will tell you what makes it good, and if we can ever live to see the same conditions prevail here I think horticulture will be an ideal occupation. At that meeting were gathered from 500 to 1,000 men, at each session, and a good many women, and not just a few bright men, well informed in their business. Their disputes, if there were any, were on the finer details of the work. They are familiar with the outlines, all of them. We found there men of considerable polish and much ability; we found young men, who had stepped, perhaps, into their fathers' tracks, they took the matter up where their fathers left off—men who could get up and address an audience in a smooth, easy, logical way. It was remarked how many could do that. Older men, too, who would speak from experience, plainly, nicely, and in a way that would interest you, and there were hundreds of them. It is a place to go to learn. I can see a great improvement in the work of the Michigan societies in the past five years. Men are becoming more common among us who can tell what they know, and I hope to see the Michigan State society reach the same high position of the society in New York; but, in order to do that, there must be a general interest taken.

The New York society numbers five hundred members and they are active. The Ontario society numbers 2,000. Just think of that. There is no antagonism between the different societies in the state of New York, of any consequence. The Western New York society seems to have the field.

Now we will come to the Illinois State society, and I will briefly detail how they are organized and work. In the first place, they have an appropriation of \$4,000 from the state for conducting their work. It is considered educational. Our own state has finally come to the same conclusion. But Michigan appropriates only \$1,500. The Illinois local societies are formed wherever they can be. Most of them are in good working order. They pay their allegiance to the state society, not in dues or funds, but in reports, keeping the parent society well informed. They have three district organizations—northern, central, and southern. These are under the direct management of the state society, which holds one meeting each year, as a state society, then one meeting with each of the district societies. They maintain twelve experiment stations, themselves. They select one of the ablest men, in a certain fruitgrowing section, furnish him the plants for testing, and pay him for the labor, if necessary, and he is expected to report on these varieties. Every year they gather, from at least twelve locations, a report as to the desirability of certain varieties and the peculiarities of varieties; and you can see,

with the allegiance of the whole state to that society, how they can advance their interests, how much of loss and failure they can guard against.

The state society of Michigan might do that, but there has been some antagonism to the state society for a number of years. That, however, I am happy to say, has almost entirely died out. It came through some ill-advised measures, no doubt. Certainly it could not have been in the interest of the public. But the Illinois people are like ourselves—they are somewhat young. They have a few men who are far up in their business—large, commercial growers, who travel and study and bring home to the rest of the society everything they learn. They have a large number, like ourselves, just commencing, and perhaps their society just about compares with ours.

The Missouri State society is almost in the same shape, but they are all in good working order, and everything is going along smoothly with them, and they are very rapidly becoming educated in their line, as we are.

QUESTIONS.

THURSDAY EVENING SESSION.

What is the effect of throwing soapsuds and soap-water around ornamental shrubs?

Prof. Slayton: Death, every time. I know that is recommended by the papers frequently. I have seen it for forty years. I have tried it some. Near my house, I have set a cherry tree, three successive times, in about five years, and I throw the slop-water there, but there is no cherry tree there now. I had a hydrangea there, and it blossomed nicely two years, and after blossoming, about the middle of August, it gave up the ghost. I remembered that I had poured cold slop-water around it a good many times, and I concluded that that was the cause of its death. I began to watch, then, and I found that every tree near the door from which I carried the slop-water, was in a bad condition; and as soon as I reflected I remembered that three or four near the house, that had died and been replaced, in some cases three times, were all dead, and I believe that slop-water is the cause. Since then I don't throw a quart in the same place that I ever threw any other quart, so far as I can remember.

A voice: The nicest quinces I ever had, had this treatment.

Mr. Wright: I have seen this operation performed on the quince trees, and where soapsuds was used the quince trees attained a much greater circumference, and never failed to produce good crops of quinces, when other people in the same neighborhood could not get quinces at all. I am satisfied that soapsuds is beneficial to quince trees.

Mr. Wilson: It wasn't soapsuds I referred to, simply dishwater.

Mr. Morrill: I don't think the advantage gained compensates for the malarial influences occasioned by throwing slops in any one place.

Mrs. Gebhart: We have made a practice of throwing slop-water around trees and rose bushes to prevent any malarial influences.

Mr. Markham: Wouldn't you advise throwing it where the trees grow, not close to the tree but between them—wouldn't that be advisable?

Mr. Morrill: Oftentimes these trees are growing close to the house, and it refers to these very trees. If any one will carry the slops away from the house, undoubtedly it is a good thing; but I wish to throw a word of caution in there, because I know how the back yards of many farm houses look.

Mr. Rork: You should make some distinction. You can kill anything with cold water if you put on enough. You can rain it to death. I find that a reasonable quantity of decent slop-water and soapsuds is a pretty good thing, and I sometimes douse the soapsuds on leaves and all, but I don't stand and pour it on. I would expect the tree to die.

What would you graft into Russian apricots; or would I better take out the trees?

Mr. B. Gebhart: Japan plums work well. Either a Burbank or a Japan.

The same question is asked as to the Mariana plum or Prunus Simonii.

A Member: I would take those out by the root. They are similar to all our natives—they are great growers on their own roots or stock, but you put something else on them and they stop entirely.

Mr. Morrill: They are good stocks for budding.

If it is true that the second brood of curculio does not get its growth until August, what becomes of the curculio during the winter months?

Mr. Morrill: I think we would better refer that to Prof. Davis at the Agricultural college.

Mr. Reid: I think he would say, "Nobody knows." Where they hibernate, I think, is not clearly known.

Mr. Rork: The potato bug goes into the earth, and I think the curculio does, too.

Mr. Reid: Ever see him there?

Mr. Rork: He is a difficult fellow to see; but you set chickens there, and they will dig, and you will find indications that they are in the ground.

Who is the largest plum grower in Michigan, and where is he located?

A Voice: Judge Russell.

Judge Russell: I am not.

Mr. Reid: How much do you weigh?

Judge Russell: Oh!

Applause and laughter.

Is it advisable to use any other fertilizer with bone, for plum trees on poor land, or what is the best treatment for such trees set out two years?

Mr. Barry: Before that question is discussed, I wish some one could give an answer to the previous one; it was not put in for fun. A young man wanted me to be sure to see what the answer was. He wants to know who the person is who has the largest orchard.

Mr. Reid: I never heard of more extensive plum orchards than in this county, and I think he could probably find that person in this county.

Mr. Morrill: I think so; I would mention Mr. Gebhart.

Mr. W. S. Gebhart: I think I have 2,560, about 2,000 in bearing.

Mr. Morrill: I know a gentleman who set 5,000 last spring, and there are to be 4,000 added next spring, near Watervliet, Berrien county, Mr. R. H. Sherwood.

Mr. Gebhart: Those varieties are all of the European type. I have some 12 or 15 varieties which I shall take up or graft over—I have been grafting them for the last sixteen years. They are not good here.

Mr. Morrill: Mr. Sherwood last spring bought and set 13,000 peach, pear, and plum trees. He has bought 19,000 for next spring. He is in a fair way to have quite an orchard. He is a good, thorough man, too.

Mr. Rice: I don't want this county to take all the honors. I am in the end of "the thumb," and there are some extensive plum orchards there. One man set out 4,000 apples and plums.

What is the best treatment for trees set out two years?

Mr. Gebhart: I have tried nothing more than barnyard manure for fertilizing.

Mr. Reid: The question is whether to use any other fertilizer with bone. The gentleman asking the question said he put on barnyard manure and turned it under, but the soil was poor, and he thought this spring he must do something more; and he wondered if he must use commercial fertilizers.

Mr. Morrill: Bone meal in itself is not a complete fertilizer. It requires the addition or presence of potash to become a complete fertilizer. Potash must either be present in the soil or be added to it. Bone meal is principally phosphoric acid with a small percentage of ammonia, or nitrogen calculated as ammonia, and that is sufficient for fruit, so far as the ammonia is concerned. But potash, if not already present in the soil, must be added. If the soil needs potash, put it on in wood ashes.

Mr. Brassington: Why would you give anything, except to produce wood growth, to a plum tree two years old?

Mr. Morrill: You must have all three of those elements to produce anything.

Q. Wouldn't a manure containing more nitrogen be better? A. It will make a more rapid, but a more tender, wood growth. It is a bad practice to push any tree too hard with nitrogen.

Judge Russell: This gentleman has set out a plum orchard, and his land is so poor that he has not been able to make his trees grow. I think he would better go out of the business there.

In applying wood ashes and bone meal to raspberries and strawberries, would you sow broadcast or apply it near the plants in less quantities, and how much should be used per acre in a young and bearing plantation?

Mr. Morrill called for.

Mr. Morrill: This is not my evening, entirely, but that question brings out one point to which there should be a little attention paid. He suggests the placing of fertilizer near the plant; or, rather, asks the question, whether it should be spread broadcast or placed near the plant. Now, we ought all to begin to get some idea of the develop-

ment of roots on any plant. Strawberries, set four feet apart, cover the ground with a complete network of roots before the next spring, and the poorest roots of the strawberry, the weakest roots of the whole lot, are those nearest the plant. Raspberries and blackberries are, I think, the fruits mentioned, and they feed all over the ground, and in putting it near the plant it needs considerable working to get it where the plant can use it. We frequently see where the farmer has piled his manure next the roots of the tree, and yet it is a well-known fact that in an old orchard the roots cover every inch of the ground. Still they will pile the manure around the body of the tree, where the roots are old. They are reaching out for new ground just as much as they can and as far out as they can. As to the question as to the amount of bone and ashes, I will say, in my own practice I like to use about 500 pounds of bone and 100 bushels of ashes per acre, for any fruit, and I don't know but if I had the bone, or could spare the money, but I would put in a thousand pounds. I have had nothing but good results from bone and ashes on any fruit, but the matter of fertilizing should be better understood. If you have but little, put it all over the ground. The same with barnyard manure.

Is there a good winter variety of sweet apple for market, and profitable, other than Talman Sweet?

Prof. Slayton: I don't know anything that will keep longer than Talman Sweet, but there is the winter Sweet Swaar.

Are dewberries a profitable market berry, and if so, how are they trained and managed when in full bearing?

Mr. Gebhart: I have had a little experience in that. I had a dozen or fifteen plants. I kept them trimmed back to four feet, and they did not prove a success, and I reset them, and cut back the ends a little, and they have borne wonderful crops the last two years.

Q. Did you train them up for fruiting purposes? A. No, not on trellises.

Q. Were they not sandy? A. No, the vines were quite thick. They were Lucretias.

Mr. Rork: I have grown them on a small scale, and there are three nice patches of them near me. Mr. Slocum, near Grand Rapids, has a fine patch of them, and makes money out of them in the home market. He gets a good price. He is growing them in preference to strawberries. He cuts them back into hills, two feet, lets them droop a little, throws short straw on them pretty freely, and lets them lie there until spring. Another man uses nearly the same treatment. He mulches a little more heavily and presses down the vines before he puts it on, and in the spring he shakes up the vines with a pitchfork. It is quite a craze in our locality. They are being badly winter-killed with us, however, unless pretty well covered. They are a fine, large berry and come in early, but the people in market won't buy them if they can get anything else. This is the Lucretia.

Q. They are generally reported as a sweet berry?

Mr. _____: Some that I had were not sweet, and they haven't much of a blackberry flavor with us, but they are fine and large.

Mr. Wright: The dewberry, as I have seen it, is sour like some of the blackberries, if picked before being ripe. They are grown in our location to some extent, and when ripe, as they should be, they are very sweet, but there is not a strong blackberry flavor to them.

Mr. Reid: Mr. Henry Hawley of Ganges has a row or two of them for family use. He sets stakes and stretches two wires to each row, leaving a space between of about a foot, and the bushes are sheared off at a height of about two feet. He said he got a large crop from them, and there was evidence of that from the old calyxes still clinging to the bushes. He did not pay much attention to them, having planted them for his own use, and I think they were in sod, but he said he got large crops. They come early and sell well.

Mr. Rork: After they are sweet, can you ship them?

A. I don't know. All I know anything about are sold in the home market, and are easily disposed of. They are rather delicate in texture.

Mr. Rork: With us, when they are ripe enough to be good, we can not ship them far.

What is Mr. Gurney's method of destroying curculio?

Mr. Gurney: I hardly dare open that subject. Of course there are many growers who think there is nothing like spraying to kill curculio. I don't think it does any good. I have 600 or 700 trees. I have a sheet put on a frame, like a wooden quilting frame, and that is on very light wooden wheels. We take a row of twenty trees at a time, and as soon as the plums get to be as large as wheat kernels we jar the trees. We tap each limb, it does not hurt the tree, and when we get to the end of the row we kill the curculio. My method is to commence early and go at it every day, until we don't get any more. We wait four or five days and go at it again. There are may other methods, but the only way I have ever succeeded is to kill them, and I have had from 700 to 1,000 bushels of fruit, and not a stung plum among them, every year. Going at it in a systematic manner, five or six cents per tree, it is said, will cover the cost of killing every curculio. With the vigilant fruitgrower, the curculio is an advantage; because, if we did not have the curculio, there would be so many plums raised they would not be worth five cents per bushel. Another thing that I have discovered, and I have practiced it every Saturday: we pick up every plum that falls from the trees, and every one that we discover is stung, and burn them. By doing that we kill the worm that otherwise would go into the ground, and every year the curculio grow less.

Mr. Monroe: My understanding is that in western New York they decided to resort to jarring.

Mr. Morrill: Weren't you in the hotel that evening, at Rochester, that we had a division of the house? I don't want to open up a profitless discussion. I had asked a question at the convention down there, and Mr. Willard took it up very sharply. I asked the question, "Do you people in western New York control the curculio by spraying?" and Mr. Willard took it up very quickly, and intimated that he thought that I was too intelligent a man to ask such a question, that any man who understood the habits of the curculio, would know that it was absolutely impossible. That was pretty good, as far as it went, but I reminded him of a fact which he knew, that the people of Oceana county disagreed on

that. One man will come up and furnish positive evidence that he has saved his plums by spraying, and another that spraying has failed. I am not a plum-grower, and I wanted to know. But Mr. Willard made that assertion, and it pretty nearly cleaned up the topic. Afterward he came up to the hotel, and took me by the collar and said, "You ought to know better than that." I said that I did not know, and that I wanted information. I had heard both sides. Mr. J. J. Harrison was there, and he said, "What is the matter with you, Willard, there are plenty of men who take care of their plums and cherries by spraying. I have orchards where I keep them off by nothing but spraying, and I preserve my fruit perfectly, and the moment I stopped spraying they were stung." Now, there were two men of national reputation directly opposed to one another, and in less than three minutes we had three men on a side, including Mr. E. Smith of Geneva and two other men equally well known. Those on one side, with positive evidence that their fruit had been saved by spraying; and those on the other side, that it was impossible. It was my "picnic." There were six of the best men in the United States, and they sat and disagreed for half an hour. They recited not only their own experience, but the tests of the experiment stations,—tests made to show that curculio could be controlled by spraying, while other stations showed that it could not be done. Why shouldn't a fellow like myself ask questions?

Mr. Rice: The region about lake Ontario, on the north side of the lake, is a great plum region. I was sent as delegate to the Ontario Fruit-growers' association, and of course this question of spraying plums came up at their meetings. The president of the association stated in regard to it, that they had definite proof that spraying did injure the curculio to a certain extent, and in this way: he sucks his food and does not get the poison in that way, but if the poison gets into the incision made in the plum, it kills the egg, and in that way helps; but that was the extent of it, and there seemed to be no disagreement of opinion at the convention.

Mr. Morrill: It would be a profitless discussion, for it will never be agreed upon, I presume.

Mr. Brassington: I would like to have Mr. Gurney, if he has had any experience in the use of commercial fertilizer, tell us what it is, and perhaps he will be able to tell us something about the profits from the use of commercial fertilizers.

Mr. Gurney: I am inclined to think it pays to put on ground bone phosphate. I think the Detroit and Chicago people make a fertilizer that is very good, and I think it pays to put it on; but you won't see much difference the first year. The next year you will, and I think it pays well.

IMPROVEMENT OF THE GLADIOLUS.

[A paper read by H. H. Groff of Simeoe, Ont., at the annual meeting of the Ontario Fruitgrowers' Association, in Woodstock, Dec. 11 to 14, 1896, and read at the Hart meeting by Mr. Rice.]

In an article published during the present year by one of the leading horticultural journals of America, the statement was made that "There had been no improvement in the gladiolus during the past ten years." It will be of interest to consider the general condition of this popular flower at that time, after it had been before the public some forty years, and since then, during which all of the new strains have been introduced.

Before going more fully into the question, I beg to advance the claim that there has been more improvement during the past five years than during the whole preceding period of its history.

The gladiolus of ten years ago descended from a cross between two Cape species, and is known as the hybrids of the *Gandavensis*, the section in general cultivation. For many years the varieties originating from this cross have been inbred without careful selection, which has resulted in one of the most variable plants known to the hybridizer. In fact, this condition is made ground for the claim that there is no advantage to be gained by hand pollinating, as the leading varieties of commerce are the outcome of natural fertilization.

The extent to which this indiscriminate seed-raising has been conducted may be better understood when it is known that commercial seedlings are often grown from seed that can be bought for a few shillings per pound. Such seed can hardly be produced from valuable varieties, for the process of seed-raising is most exhausting to plant life, and so apparent is its effect on the degenerated vitality of the hybrids of *Gandavensis*, that if they survive the effort, it can not generally be repeated without an intervening season of rest.

Now, to admit this sweeping assertion is to concede that the work done during a comparatively recent period, the first results of which were introduced about five years ago, has indicated no advance on the line of improvement, and that the time of Kelway, Souchet, Lemoine, and others has been wasted, in their efforts to increase the beauty and strength of the subject of this paper.

It will here be in order to consider the meaning of the term improvement as applied to the gladiolus; and I take the practical and popular ground that it should mean, first, the beauty of the individual flower; second, strength and vitality of the plant; and third, arrangement.

During the past season, many visitors to my trial grounds, containing some 1,000 named varieties, would stop before a hybrid of distinct merit. The plant and straight spike stood six feet high, bearing a few open flowers rivaling the orchid in richness and beauty. Without exception it was pronounced the gem of the collection, thus proving the first principles of improvement.

We often hear objections made to a variety or strain, condemning it for lack of substance. Now, while camellia-like petals are most desirable and too rarely obtainable, their absence can not be made a point for rejection, unless at the sacrifice of some of our most beautiful varieties. Substance is largely a question of weather; for if, after a period of cool, moist conditions a few hours of intense heat prevail, very common occurrences in our variable climate, large flowers must wilt, and the larger they are the worse they are affected. The remedy, however, is easy and most satisfactory. Cut the spike when the first flower opens, letting it bloom further in the house, where the last bud of any size will do even better than in the open ground. This treatment also strengthens the bulb.

The first of the crosses between the hybrids of *Gandavensis* and species is popularly known as the Lemoine section, the varieties of which in general cultivation partake largely of the characteristics of the species, their peculiarity being rather weak plants with crooked stems, bearing small, bell-shape flowers. From these conditions the past five years have seen developed one of the most beautiful and popular gladioli in existence, a plant of great vigor, straight spikes, and flowers of the largest size.

Among the newer hybrids and the best finished of the crosses with the species *Saundersonii*, is the Nanceianus section, introduced in 1890. While the general coloring of this strain is in shades of red, partaking as it does so largely of the blood of the species, the wide-open flowers are of enormous size and great richness and brilliancy of coloring. The plants of the newer varieties are robust, the flowers of good substance, and bulbs of great vitality:

To say that this is no improvement is to ignore a class the influence of which will be seen in choice work yet to be introduced. That section of European origin offered under the name of *Childsi*, in 1893, is the latest of the *Saundersonii* crosses in order of introduction. It is the result of crossing the hybrids of *Gandavensis* on the species. The plant is of robust habit, with flowers of the largest size. While lacking the finish and coloring of the Nanceianus section, it contains the first break from red shades among the *Saundersonii* hybrids as known to the amateur.

It has been my privilege to test many varieties in advance of their dissemination, among which are the new hybrids originated by Mr. F. E. Gray of Alhambra, California. When these are introduced the value of the infusion of new blood of the species will be more fully appreciated. With me these plants, bearing spikes over two feet in length, attained a height of fully six feet, with flowers of the *Gandavensis* form, four inches or more in diameter.

Without reference to any strains yet to be introduced, it is with all confidence I rest my contention on the evidence preceding, that the gladiolus has improved, and will continue to be improved for many years to come.

PROCEEDINGS OF THE SUMMER MEETING.

HELD IN ST. JOSEPH, JUNE 10, 11, 12, 1896.

Only in respect of attendance was the midsummer meeting of the society, at St. Joseph, the 10th to 12th of June, anything but the successful occasion which it was hoped it would be. This was no doubt due to the exceptionally early season bringing on the press of work in the berry fields earlier than was anticipated. Otherwise the meeting was in many respects one of the best the society has recently held.

The first evening was devoted to the discussion of a few questions from those in the programme, and to the address of welcome and response thereto, the former being made by Mr. N. A. Hamilton of Niles and the latter by Secretary Reid.

Considerable exhibits were made of strawberries and cherries, but the lateness of the season for the former made the entries much smaller than they otherwise would have been. Cherries were in abundant supply and of highest quality, and there were many samples of green fruits—peaches, pears, plums, currants, gooseberries, etc., all having some interesting quality.

St. Joseph is a delightful place for any sort of meeting in the summer time. The town itself is an exceptionally handsome one in many respects other than its truly magnificent lake front, the streets being clean and well shaded, the lawns for the most part neatly kept, many of the residences handsome, the business portion paved, the stores up to date in stocks and appurtenances, the newspapers enterprising and newsy, the hotels admirably kept, especially hotel Whitcomb, which was society headquarters; and, above all, the people intelligent, fraternal, and hospitable to a degree which leaves to their guests nothing to be desired, and imbues them with a feeling of inability ever to adequately return the courtesy and kindness which they meet at every hand. Certainly the horticulturists left the city with only the pleasantest recollections of their too brief enjoyment. The most striking feature of the town is the high bluff overlooking lake Michigan, along which a considerable distance is a walk through a narrow but well-kept park, affording delightful and inspiring views of the lake, an object of never-ceasing interest to every visitor. The pleasures of this promenade were enjoyed by the fruitgrowers to their limit, and recollection of it will linger long in memory.

A most pleasant and valuable feature of the meeting was the drive made about the country Friday forenoon. Here again the generous attention of the St. Joseph people was manifest. Carriages were provided for from sixty to one hundred guests, including the delegation from the nurserymen's convention, and they were taken south from St. Joseph, then east across the river, out to the orchards of President Morrill, and back through Benton Harbor. Despite the cold, drizzling rain which fell during a considerable part of the forenoon, this ride was enjoyed thoroughly, both for the beautiful scenery it afforded and for the study of methods of cultivation of nearly every species of fruit grown in the state. Upon many of the farms the cultivation is of a high order, though there were enough lamentable exceptions to mark the rule. On the whole, we think cultivation is much better in this region than in any of the counties further north. Only in a few cases, however, was apparent the practice of thinning the fruit from peach trees. The only orchards which were inspected on foot were those of Mr. Morrill, of which much has already been said in print, and concerning which the report of the committee given herewith in no respect exaggerates. The scrupulously clean ground; the wonderfully perfect and vigorous foliage, marking the orchards from a long distance; the strong, smooth, healthy trunks; the rich earth, showing everywhere the color and texture acquired from generous fertilizing; the abundant fruit, carefully thinned, only that which was perfect remaining; the remarkable size of the trees according to age; the round, open, symmetrical heads of the trees, set low on the trunks, bearing evidence of extreme care and intelligence in pruning, and the general air of thrift and completeness, elicited unrestrained praise from every visitor. It was clearly evident to all that Mr. Morrill's precepts, so often and freely given to his fellows, in no respect exceeds his practice, but, rather, are below his actual demonstration of them. In comparison with the orchards of Mr. Morrill and some others of the neighborhood, there are thousands of plantations in Michigan which appear as brush patches; and still the owners of the latter think they are growing peaches as well as anybody. Verily, the average Michigan fruitgrower has much yet to learn and much still to practice before he becomes really worthy of his calling.

The visit of a delegation of twenty to thirty members of the American Nurserymen's association, which had been in session the preceding two days, in Chicago, added very much to the interest of the last day's proceedings. These gentlemen made many expressions of their wonder and pleasure in the views they had that morning of Michigan orchards and methods. Not less profuse were they in their thanks for the hospitalities they enjoyed. Among the number was Prof. VanDeman, now of Virginia, but for some years a resident of Michigan, and who was for some time pomologist of the national department of agriculture. His participation in the discussions was a source of much enlightenment to his hearers. The nurserymen were an exceptionally bright-looking lot of men, coming from nearly all the eastern and some of the southern states.

REPORT ON INSPECTION OF NURSERY STOCK.

The matter of inspection of nursery stock brought into Michigan from other states being under discussion, a committee was appointed to formulate the opinion of the society upon the subject, which they did, and the following resolution from them was adopted unanimously:

Whereas, The state of Michigan is fast becoming one of the foremost states in the Union in the production of the various kinds of fruit; and

Whereas, The introduction of the numerous deadly and injurious insects and fungous diseases which prey upon the fruit trees and vines is fast becoming a menace to the industry; and, considering that many of the other fruitgrowing states have enacted laws for their protection, therefore be it

Resolved, That a committee of three be appointed to procure the necessary information and draft a bill providing for the proper guarantee or inspection of all fruit trees and plants introduced into this state from others, or from abroad, as well as a proper inspection of those grown at home, said bill to be presented to this society at its next annual meeting for its consideration, after which we shall endeavor to procure its enactment as a law.

ASA W. SLAYTON.

R. D. GRAHAM.

C. A. SESSIONS.

REPORT ON EXHIBITS.

Although few in number, the entries were of unusual excellence. The season for strawberries being about over, and few of the other fruits in condition, accounts for the small size of the exhibit.

In strawberries we find a large exhibit by A. B. Bishop of Riverside. It contains nine varieties and includes a number of the new and promising sorts. We recommend that he be given the first prize for the "best box of strawberries for market, color, firmness, and form to rule," for Brandywine, which stands high in all of the points named. We award the second prize to Greenville. As compared with Bubach, which was considered for second place, the specimens shown were more regular and even in form, with little difference in color and firmness. Marshall and Dew, although of high color, were less firm, and, particularly in case of the latter sort, inclined to be coxcombed to an extent that lessens their market value. We also give Mr. Bishop the first prize of \$2 for the box of largest strawberries, upon Dew, and the second prize of \$1 for Marshall.

The premium of \$4 for the best collection of strawberries, not less than five varieties, for market, color, form, and firmness to rule, is awarded also to Mr. Bishop. In addition to Brandywine and Greenville he exhibits in this class Bubach, Tennessee Prolific, Enhance, Marshall, and Crawford. Timbrell was also shown, but its color and irregularity of form are against it as a market sort.

The award for the best box of sour cherries goes to B. F. Pixley of St. Joseph, for Early Richmond. That for the best box of sweet cherries to Stephen Cook of Benton Harbor for seedling No. 2. For the best collection of cherries for market, the first premium is given to Geo. W. Rose of Benton Harbor, for Richmond and two sweet sorts; and the second to Mrs. Juan Hess for Royal Duke and Napoleon Bigarreau.

Geo. F. Comings exhibited an excellent box of Red Jacket and a box of Early Richmond.

We award the premium of \$3 for the best collection of roses grown out of doors, six or more varieties, including Gen. Jacqueminot, Paul Neyron, Mad. Plantier, John Hopper, Capt. Christy, Gloire de Margottin, and Gen. Washington to Dr. A. D. Brown.

We desire particularly to call the attention of the society to two varieties of seedling cherry (unnamed) originated twenty years ago and exhibited by Stephen Cook of Benton Harbor. They are seedlings of Yellow Spanish crossed with Black Tartarian. No. 2 is of large size; very dark red, nearly black; ovate heart-shape, flattened on one side; stem 1½ inches long, slender, deep set; skin firm, pulp moderately soft, melting, very dark red; quite sweet and juicy. Said to be very hardy and productive, after a test of twenty years. A very promising sort for market or family use. No. 4 is of a dark, rich red slightly shaded with black; large; slightly ovate, laterally compressed, slightly heart-shape; stem rather larger than No. 2, firmly inserted; flesh quite firm; free from strings, sweet, light red, free. An excellent shipper. Both of the above sorts are too promising to be lost sight of, and we urge the originator to have them tested in other sections.

We also noted a seedling strawberry originated by Thos. Wilde of Harrington and named Flush. The foliage is large, firm, and healthy; fruit-stems very stout, berries large, regular, and quite firm; color light red; flavor good, slightly acid. Season said to be late, about with Gandy. Worthy of trial. If it proves equally valuable in other sections it will find an empty place in the fruit list.

There was also on exhibition by Geo. F. Comings of St. Joseph a collection of pear twigs showing the foliage and fruit of twelve varieties.

R. Morrill of Benton Harbor exhibits a branch of North Star currant. It is of strong growth and very heavily laden with clusters of medium size. The berries are of good size, bright red, and just beginning to ripen. Mr. Morrill also shows a branch of Columbus gooseberry. This also shows a strong, healthy growth, and bears a very heavy crop of large, yellowish-green oval berries.

Other parties have brought in branches of peach, plum, apple, and cherry, which show that the fruit trees of all kinds in this section are already bending under their load.

Mrs. B. F. Pixley has contributed a number of handsome ornamental plants, including palms and ferns, for the decoration of the hall, and the thanks of the society are due to J. H. Brumby of St. Joseph for his efforts in ornamenting the stage with greenhouse plants, hanging baskets, and cut flowers.

J. R. Johnson of Dallas, Texas, exhibited a plant of the Columbian Imperial grape, together with specimens of the branches, leaves, and green fruit. It is claimed to be of Labrusca parentage with a trace of Riparia, but the latter does not show in the foliage. The plant is very strong and vigorous, with numerous roots of unusually large size. The stems are coarse but firm, with internodes of medium length. The foliage is very large, smooth, and but slightly lobed; petals very long and stout. From the half-grown specimens it is evident that the bunch is of large size, with berries of enormous dimensions. The appearance of the plant indicates that it has unusual ability to withstand drouth and disease, and, as it is said to have originated in Ohio and to have withstood a winter, with a temperature thirty degrees below zero, in the northwest, its hardiness in Michigan is probable.

Your committee visited the fruit farms of the president, R. Morrill, June 11. The blackberry plantation is remarkably fine and is setting fruit abundantly. The treatment of the vines is peculiar, they being cut back to less than three feet, each vine being tied to a wire stretched along the rows. The peach orchard of Mr. Morrill, comprising thirty-five acres in excellent condition, contain a large number of trees set during the last three or four years which are loaded with fine fruit. The soil is of ideal quality, heavily fertilized with wood ashes and freely cultivated with Breed's weeder. The system of pruning is peculiar to Mr. Morrill. The trees are headed low and the tops are severely cut back each year. An open top is secured for the purpose of receiving the largest amount of sunshine. The large number of muskmelons just coming into flower are in fine condition and promise a large crop.

We also find a large and interesting exhibit of pumps and spraying apparatus by Morrill & Morley of Benton Harbor. Their Eclipse pump has recently been improved in several minor points and deserves high rank on account of its simplicity and durability of construction, easy working, accessibility to different parts, and, above all, its efficiency. The assortment of bamboo and brass extension rods furnishes sizes adapted to all kinds of crops, and form an attachment that should be with all spray pumps. The double Vermorel nozzles, as shown by the above firm, are adjustable at all angles and do excellent and rapid work. The copper

strainer shown is a great convenience in the preparation of Bordeaux mixture, and something of the kind would do much to relieve spraying of the serious annoyance of clogging of pumps and nozzles.

We also noticed on the table a new western weed called tumble-mustard (*Sisymbrium altissimum*) which is doing so much damage in Minnesota. It has entered Michigan via Benton Harbor. One hundred plants were found growing just south of the Vandalia salt warehouse, June 10, 1896. Your committee recommend that the proper authorities be asked to destroy these new pests.

L. R. TAFT.
C. F. WHEELER.

RESOLUTIONS.

Next are the resolutions of the regular committee, the most important feature of them being the one pledging the society in favor of the law which directs the marking of fruit packages, about which there was considerable discussion, all in favor of upholding the law:

Resolved, That the thanks of this society be tendered the good people of this delightful and beautiful city, for their kindness in providing us this hall; for furnishing teams and carriages for the much-enjoyed ride; for the various courtesies; to the ladies for the decorations; to the electric railway company for the excursion tendered; to the press, which has given such able reports of our meetings; to Profs. Wheeler and Taft for their helpful words along the lines of their scientific studies; to the gentlemen of the nurserymen's convention, whose presence has added so much to the interest of our last session.

Resolved, That we recognize the importance of strict and careful grading of fruit and the honest packing and marking of same; that the use of short or off-size packages, and "stuffing", are not only dishonest but detrimental to our interests in every way, and we recommend the enforcement of the package-marking law.

Resolved, That the growing demand for higher social and intellectual culture, with the vast improvements in productive machinery, render it desirable that less time be given to labor and more to head and heart culture.

Resolved, That, as we all believe that the gentle arts of horticulture, floriculture, and home adornment tend to refine and elevate human character and society, we therefore recommend and appreciate the work of the State Horticultural society as one of the beneficent institutions of our grand state.

R. D. GRAHAM.
S. H. COMINGS.
F. E. ROOD.

PAPERS AND DISCUSSIONS.

ADVANTAGES OF LIVING ON A FRUIT FARM.

BY MR. J. A. DONALDSON OF ST. JOSEPH.

The man who owns a small farm of good soil, in a favorable location, well set with the various kinds of fruit and ornamental trees and shrubs, well cared for, comes as near having an ideal home as it is possible to have; and if he is situated where he can get his perishable products to market in proper time, he has good reason to feel contented. For, although he can not indulge in the hope of acquiring great wealth, he will come nearer realizing a happy life than those who make slaves of themselves to accumulate fortunes.

It is the first lesson that one needs to learn, who is in pursuit of happiness, to be contented with an average share of the goods of this world, and that the dwelling in "marble halls" does not add so much to a person's happiness as the many inexpensive things within reach of people with moderate incomes, and the pleasant, trivial incidents that accompany every moment of one's existence.

The benefit that children derive from a rural home, both moral and physical, should be considered a very great advantage. At such a home the best foundation is laid for the usefulness of men and women; for, instead of spending their time on the streets of cities, because their parents have no employment for them, they are brought up with habits of industry. It is a notable fact that a large percentage of the men who are conspicuous in this country for great achievements originated on the farm. Had these same men been reared in a large city, their physical development would probably not have been as good, and some of them might have been ruined in early life by the temptations that beset the youth of cities. Of the forty-four men chosen from the city of Chicago for directors of the World's Fair, a very small portion were raised in cities. A few were natives of Chicago, but Chicago was youthful and innocent when they were born.

Another advantage that attends the business of fruitgrowing is, that it is less liable to the serious reverses that often ruin people in trade. If a man has an unencumbered farm to begin with, and understands his business, is industrious, prudent, and of good habits, and favorably located, his chances of losing his farm are very small; for although there will be years of more or less failure, his average income can be made to exceed his expenses, even with the present low prices of fruit.

The unstinted amount of fruit which a fruitgrower is able to supply his table, fresh from the tree and vine, is a consideration that should not be overlooked. Such a healthful luxury can only be enjoyed on the farm, in perfection, as it need not be gathered before it is in its best state for eating.

It is not the purpose of this paper to influence men without experience to change their vocations to engage in the business of fruitgrowing for a livelihood, but to make those who are comfortably situated on fruit farms satisfied to stay. It requires a knowledge of the business to make it profitable, but, if one does not wish to make it a dependence, experience is not so important. But, whether the fruit farm is made a home for pleasure or profit, it can hardly fail to make satisfactory returns to people who enjoy rural life.

DISCUSSION.

Mr. Comings: I think the best way would be to fall in with the current of the paper, and extend it a little. Man was placed, we are told, in a garden, close to nature. I do not believe many here realize how absolutely necessary it is for man to have contact with nature in some way, with land or water or some feature of nature, to be a properly developed, well-balanced man; and in this country we have today to face conditions which are very undemocratic and very unhealthy from the fact that a large number of our people have become what is called "factory slaves", people whose whole life is spent away from nature, having no contact with the gardens, fruits, vines, or flowers; and that is unhealthy, abnormal, and wicked, and will always produce a slavish character and development, and so a large proportion of our people have drifted into this condition of life that it is a serious question for the future of our republican institutions. I knew a striking case, a few years ago (I have known others similar), where a man began working in a factory at \$1.50 per day. Later he received \$2, and then he was put on piece-work. He worked in one factory twenty years, and when he left that factory he had saved more than his twenty years' wages, and this is how: He had gone outside of the town and bought a lot, beautified it, had a garden and fruits, a horse and cow and chickens, and he had brought up his family there. He worked four to six hours per day. When he had made \$2 he went home and worked on his little garden, and in the twenty years he had developed four such homes and sold them at a profit. So he had made his living and supported his family; his boys had been brought up gardeners and had become good citizens, whereas, if he had rented a home, his boys would probably have grown up rough and perhaps worthless, and certainly would never have been worth as much as citizens. That is my idea of our civilization. A man should have his own leisure time, and his work should be in the garden, where God planted man. These leisure hours should, a part of them at least, be devoted to some pursuit which would bring him nearer nature. I believe that is the only way a correct civilization can be developed. That perhaps is a radical idea.

Mr. Morrill: I am glad Mr. Comings adds that idea to the paper, because it is practicable and perhaps at the same time idealistic.

Mr. Comings: I believe it is thoroughly practicable. Nelson at St. Louis, and the Ivory Soap company, insist that every man shall have a garden of his own. The struggle for eight hours per day in our factories is opposed by many men here. To me it seems like putting a block in the way of civilization. I believe no man has the right to work more than six or eight hours per day. Our men in the offices and factories become warped and distorted by lack of contact with nature. What is natural is scientific.

Mr. L. W. Ruth: A man told me that he was going to move to the suburbs and get some chickens and a cow, and get right down to Mother Earth. He felt that he needed to come into closer contact with nature. There is no question but men develop better under these circumstances. It may be that we farmers are growing one-sided by too much nature and not enough business life. If we could mix it up advantageously, unquestionably we would be the better for it.

Mr. Morrill: In this locality there is that condition of affairs, more than in any horticultural or agricultural district of which I know. The farmers live near the city, and are familiar with its life, and most of the people of the town are more or less interested in farming.

Prof. Slayton: I believe it would be cheaper for the state to oblige every family to cultivate a half dozen fruit trees than to maintain all of the jails and prisons of the state; and I believe if the first were done the jails and prisons could be largely abandoned. If all children were brought up under fruit trees there would be less stealing.

Mr. Wilde: When I was a boy, my father thought I ought to learn a trade. I learned the tanner's trade. I went to work by the piece and I was called by bell, and finally I felt that I could not endure the confinement longer. So I started for Michigan. I bargained for the piece of land where I now am, and when I reached here I had just one dollar left. We have gotten along very well. I have not tried to become rich, but rather to be comfortable and to enjoy myself and family. I have a large family, and I have never regretted that we struck out and came here.

THE VARIOUS PHASES OF SPRAYING.

BY MR. WM. A. SMITH OF BENTON HARBOR.

As horticultural productions increase, the enemies that feed and breed upon them increase in like proportion. As the land becomes denuded of forest timber, many of these insects seek and find shelter and breeding places in our orchards and berry patches. These are mainly divided into two classes, those that take their food and nourishment by eating the foliage and fruits, and those that live by sucking the juices of the fruit and plant. Of the former class, the potato bug and slug, the tent caterpillar, canker worm, and currant worm, are familiar examples; while the San Jose scale, plant lice, squash bugs, etc., are peculiar to those of the second class. While the eating insects can be in a measure controlled and destroyed by a judicious system of spraying, the other class must be treated in some other way. The system of spraying has now become so general, I might almost say universal, there is no longer any secret in its application nor doubt of its good results if properly and judiciously applied.

The first spraying practiced in this locality was done some nine or ten years ago. The pump used was a rotary one, procured from a saloon where it had done service pumping beer. Whether it had become demoralized in this service I can't say, but it failed to give satisfaction in field work; yet in both cases it doubtless destroyed animal and insect life. The next pump introduced here was the Lockport force-pump, some specimens of which are still in use. Since then many different forms and many improvements have been introduced, so that now the machinery is well nigh complete. There is now no longer any excuse for fruitgrowers, in this locality at least, being without this adjunct of their business, as pumps can be procured, and these of the best style and action, in this immediate vicinity. In the case of caterpillars and cankerworms, spraying is doubtless the most economical and sure remedy. Certain parts of this county have been infested for years with the destroying cankerworm. Not long ago I visited an apple orchard of some 200 old, large trees. These trees looked as though a fire had swept over every branch. Another orchard in the immediate vicinity had been sprayed three times, and that remained healthy, though some trees near the line were affected somewhat. In this case the crop of fruit for this year is utterly destroyed, and the prospects for a fruit crop next year is not much better; because the foliage must be renewed before the necessary preparation can be made for the next crop of fruit.

The cankerworm does its work upon the foliage of the tree, the codlin moth upon the fruit. While the former does its work mainly in the spring, when the foliage is young and tender, the latter continues its work during the whole summer; and how to save the crop from this persistent enemy has baffled some of our best fruitgrowers. Years ago we were taught that there was but one brood of these insects, and that the

eggs were deposited in the blossom end of the apple; that by spraying the trees at the proper time the poison would settle in this part of the fruit and destroy the larva when it began its work. We know full well that these eggs are not all deposited in one day, nor one week, and probably not in four weeks; and that to be effectual the larva must reach the poison in the very beginning of its existence or it will soon be beyond reach. Hence so many failures to reach even the greater part of this first brood. But is this the only brood of these insects we have to fight? Like the potato bug, the curculio, and many other pests, they remain with us all summer and then go into winter quarters and are ready to begin their life's work the next year. The single-brood theory of the codlin moth has long since been discarded. As a rule, the late varieties of apple are far more exposed to these insects than are the early varieties. The latter will not unusually go through in a good, marketable condition, while the former will be almost wholly destroyed by them. Just how late spraying, after the blossom end turns down and can hardly be made the receptacle of the poison, can or does affect the larva or the moth is a point not entirely plain. Theory in these matters is one thing and practice is another.

In the summer of 1895, or rather spring, for my first spraying was for scab, about the time the leaf buds were starting, a regular drenching of the trees, body and top, was given. The next was soon after the trees were out of bloom; again, about two weeks later, and again when the fruit was about one quarter grown. In the meantime, about the first of July, I bandaged my trees with heavy felt paper strips six inches wide. These were examined every ten days, and the larvae destroyed, from 10 to 25 per tree at each examination. These examinations continued until the month of October. These larvae had done their work on the fruit before seeking refuge under the bands, and the bands could only be of effect the next season. I found that by placing these bands or traps near the crown of the tree and having them fit close to the bark, they proved more effective than when placed higher up. The summer of 1895 was exceedingly dry and so was that of 1894, seasons in which these moths could work without interruption, and hence the general destruction or damage to our apple crop. I am satisfied that some additional remedy will be necessary to save our late apples, whether that remedy is bandaging the trees or turning hogs or sheep on the ground to destroy the droppings, or both.

Much damage has been done by inexperienced sprayers to the foliage. This has often been the case with the Baldwin apple, the foliage of which is somewhat tender. Sometimes the spraying is too heavy, sometimes the ingredients are not properly mixed, hence damage and not benefits result. It would be well if we could have a professional sprayer in each fruitgrowing section, with a good outfit, a practical experience, and a disposition to do thorough work, instead of the present haphazard way of doing, as it would in the end be far more economical and much more efficient.

In spraying for the fungous growth, my experience is somewhat limited. In the spring of 1895 I sprayed my apple and pear trees, about the time the buds started, gave them a regular drenching. Later, I sprayed again with the insecticide added, and awaited results. Among the

varieties of pear were Flemish Beauty and Seckel, which are peculiarly subject to scab. The season was very dry, for weeks not moisture enough in the air to form dew on the grass, if there had been any. The fungi had little chance to grow. I watched the fruit on those trees with considerable care, but saw no sign of scab until after the first rain, along in midsummer, and then very little. My first impression was that this time I had made a success and no mistake. But later in the season, when the fruit was ready for the harvest, by observation and reports from my neighbors, I learned that their fruit was equally good as mine, although they paid no attention to spraying. First conclusions are not always correct. Perhaps, under different atmospheric conditions, the results might have been widely different.

As to spraying for the plum curculio, there is a wide difference of opinion. Just how the poison will or can reach the larva when it begins its work is somewhat a mystery. The female makes a crescent cut, raises the flap of cuticle, deposits her egg, and replaces the skin. If in this case the poison could penetrate the cut at all, it would probably be before the egg had passed into the larval state, and would likely become neutralized by the juices of the fruit before the larva was ready to feed. As this process of stinging the fruit continues day by day until the fruit is mature in size, there is little chance of protecting the fruit in this way, unless the curculio herself takes the poison and dies, which is somewhat doubtful. With such varieties as Lombard and others of that class, that set three or four times as much fruit as the tree can well mature, it is easy enough to save the crop by spraying; but with those that set fruit more sparingly, the supplementary process of jarring is essential to save the crop.

Aside from protection to the fruit, spraying the plum trees with Bordeaux mixture is doubtless a good protection to the foliage. Some years ago, before I commenced spraying my trees, the foliage on most varieties was attacked by a species of rust which caused the trees to shed most of their leaves before the fruit was fully mature and hence lacking in color and quality. Since I have sprayed my trees the foliage has remained in a healthy state and the fruit matured in its proper condition.

The country is now abundantly supplied with theories and formulas in regard to spraying, so that I need not, even if I could, add any additional ones. A few simple rules or directions should be observed. First, the sprayer should provide himself with a good outfit, in the shape of a well-tested force-pump; second, he should understand the most approved proportions and the proper admixture of his spraying materials, and, third, he should know when and how to make the application, and then do it in a workman-like manner.

DISCUSSION.

Mr. Morrill: A fine spray you consider more economical and reliable?

Mr. Smith: Of course, it takes a good power to send a spray into the top of a high tree, and you must have good weather, free from very high winds. That is altogether a question of nozzle and pump.

Mr. Judson: What is the best solution to spray with now—Bordeaux mixture, or Paris green and arsenic without the Bordeaux mixture?

Will the Bordeaux mixture speck or discolor the fruit? I wish to spray my apples pretty soon.

Mr. Smith: My own experience in this matter is all I can speak of. I use six pounds of sulphate of copper and four pounds of lime. I use London purple in place of Paris green because it is not quite so heavy. I use this amount to fifty gallons of water.

Q. How much London purple do you use? A. Four ounces makes it sufficiently strong, in my opinion. My greatest difficulty has been in getting the lime in the right shape to add to the spraying materials without clogging the pump. It requires a strainer before you add the lime. I use milk of lime, but notwithstanding that it has a tendency to clog the sprayer frequently. If we had the right kind of apparatus, with a fine sieve, to run the milk of lime through, before it enters the barrel, perhaps that could be avoided.

Mr. Judson: I find that spraying two or three times doesn't do for me. On my apple trees, last year, toward the first of August, you could hardly find a wormy apple, and when I picked them there was hardly one but was wormy. Where did the worms come from? Did they come from the few that were left, that did not get the spray, or from the neighbors' orchards? I find it is necessary for me to spray two or three times more. I have sprayed three times already, and I expect to have to spray two or three times more, to get apples that are perfect.

Mr. Morrill: You may have to spray your neighbors' orchards.

Mr. Judson: That is what I wish to know. Will these fellows travel very far?

Mr. Smith: Probably the gentleman will have to spray later in the year. In 1894, I had as fine prospects for Baldwin apples as I ever saw, and when they were one third grown they were entirely free from worms, and I told everyone I was going to have the finest kind of crop of apples. Everything else came on, and I stopped spraying. The apples were then as large as walnuts, but when I came to pick them every one had two or three worms. The codlin moth kept working on them all summer, and there was no rain. That question comes in, how late can we spray advantageously to destroy these worms? I was never more surprised in my life than that year, and I almost lost faith in spraying. The apples looked so fine and clear and large, and when it came to the picking I didn't have any.

A Member: That is the experience I had last year. I sprayed everything, as I thought, as long as the bulletins recommended, and everything that ripened before the very late pears was perfect. But after that, even the Seckels, which only ripen ten days or two weeks later, were wormy as well as the Baldwins and everything else. I might have sprayed one or two times less, early in the season, and put it on later. It perhaps would have been better.

Mr. Morrill: I do not think Mr. Judson's questions have been answered yet. He asked if the poison should be used with Bordeaux mixture.

Prof Taft: I was asked that question last night, and my reply was that when I get home next week I shall spray the apple orchard again, and in that be guided by the conditions. If between now and then we have warm and pleasant weather, I shall not think it necessary to use the Bordeaux mixture, but I shall use the insecticide for the codlin moth.

If I find that there is any appearance of seab, and the conditions seem to favor its growth, I shall spray with Bordeaux mixture as late as the middle of July or into August. I usually commence in June, if the season is very moist, and keep it up until August, say, giving three applications after June; doing this, I have been able to save nine tenths of the apples, entirely free from seab, where the proportion was reversed on the neighborhood trees. As to the question regarding the injury, I make it a practice always to reduce the strength as the season advances. I think the fruit is less able to stand a strong solution, and the repeated sprayings increase the amount on the fruit and the danger of injury.

Mr. Morrill: You are speaking of rusting now?

A. Yes, burning. I never use it quite so strong as Mr. Smith does. Even in the first application of Bordeaux I only use two pounds to twenty gallons. He uses six pounds to fifty gallons. About four pounds to forty gallons has been as high as I have ever used it; the next time, four to fifty gallons, and finally four to sixty. In some cases I found it necessary to spray with some fungicide when I did not like to put on the lime. I was afraid that the lime would remain there and form a whitewash, and I found as good results, though less permanent, with a weak solution of copper sulphate. That is the active principle in Bordeaux mixture, but the great trouble is that it washes off. But to destroy the spores that will be there in a few days I find it gives better results than Bordeaux mixture, even, but it does not last, and if you had to put it on again it would be required sooner.

Mr. Wilde: Do you reduce the arsenites as well as the lime?

A. Not if I am using Bordeaux mixture. At the least, I use three ounces to fifty gallons; and, too, it depends on the insect for which I am spraying, a good deal. If the canker worm is sprayed for, as it should be, when they are very small, it would be sufficient to use three or four ounces in fifty gallons, but if they have gotten a start I like to knock them out as soon as possible and I increase the strength. With the lime, you can use five ounces, or more than that, perhaps, to fifty gallons of water, and so for any insect, I try to adjust the strength according to the requirements.

Mr. Cook: I am satisfied, from my observation, if we have dry weather about the time the fruit is setting, after the fruit is in blossom, we are not likely to see much fungous growth. If the weather is moist and warm at that time, that is the critical period. I am satisfied, after the fruit gets to be large, it will not injure it much. The critical time is when it first sets. I have known pears to be affected before they were fairly out of blossom. In California they are not troubled with seab, because at the time the fruit sets they have dry weather. Last year and this year it was dry when our fruit set. I can not keep the codlin moth from getting into the early fruit. In order to succeed in this, all the loose bark should be scraped off in the winter. If you do it in the winter it will destroy a great many of the larvae secreted under the bark. The larvae do not leave the apples that are stung unless they fall to the ground, or if they can leave them in the night, because then they are not likely to be caught. They will crawl down the tree, find a place to hide and in which to turn into the moth state; but if the bark is scraped off, the loose bark, they will go under paper bands (if they have previ-

ously been placed there), and those that fall will go up the tree, looking for a place to hide, and if there is no loose bark they will go under the bands.

Prof. Taft: I wish to testify to the accuracy of Mr. Cook's observations. I think he has given you the facts just as they are, and I can also say that a band put around the tree in the spring will be of no value until about June, so there is no use in putting on the band until about that time, from the fact that the only insects that go in there are the worms that come out from the first brood. In regard to spraying, I think it is of the greatest importance, whether you are spraying for the codlin moth or not, to spray early. We are most likely to have injury from scab when the weather is moist and warm, about the time the fruit is setting. Two or three years ago we had these conditions prevailing when it was in blossom, and the fungus worked on the blossom and stem, and the fruit did not set. To save the crop from this disease, I think it is of great importance that we spray even before the fruit blossoms. My practice has been to spray just before the blossoms open, for the purpose of coating over the leaves at that time, and to protect the blossom stems. If we can do that we can save the crop up to that time, and three years ago we lost a crop because the blossom stems were not covered; and then, just as soon as the blossoms have fallen, we go over it again to coat the young apples thoroughly, and use the arsenite to destroy the codlin moth; otherwise the eggs deposited at first will hatch, and the little worms will be beyond the reach of our poison.

Mr. Comings: What progress has been made in finding substitutes for arsenical poisons? It is stated by authorities that the very slight trace of muriate in sugar is producing a large increase in the kidney diseases of the country. The arsenical poisons are powerful chemicals, and I should be glad to use something else. The amount we breathe would be, according to homeopathic ideas, a strong medication, to say nothing of the amount we get on the skin of the fruit. Are there any successful substitutes being found?

Prof. Taft: No, sir. But there are various forms of arsenites used.

Q. Do you hear any criticisms of arsenites, as concerns the health of the people?

Prof. Taft: Nothing worth considering, from the fact that the quantity used is very small indeed, and the amount that remains on the fruit is comparatively small, especially if we use it anywhere from six weeks to six months before the fruit is eaten. It becomes greatly reduced, and taking into consideration the amount which physicians say is harmful we could eat several bushels of fruit without danger.

Q. But we breathe it.

Prof. Taft: The material being in solution, I do not think there is danger in breathing. You might take a small amount from the face and hands, by absorption. I won't vouch for the analysis, but I have seen the statement quoted by reliable persons, and so often that I feel it comes straight, that there is more arsenic in our wheat than upon the apples after they are sprayed; and if we can eat wheat as we do, and have for thousands of years, without harm, I think we can eat the apples with safety.

Mr. Cook: I understand this fungus is cold-proof. Why not spray in cold weather?

Prof. Taft: It has been done, and can be done, any time in the winter, and then I would use only the copper solution, which is more effective than Bordeaux mixture. This would be effective against any disease. When we use Bordeaux mixture, which is practically insoluble in water, it settles to the bottom, and is not nearly so effectual as copper sulphate, except as it becomes dissolved, later on, by the ammonia in the air—there is a slow solution which takes place, and in that way it becomes effectual. If there is no foliage, I would always use copper sulphate, and I have had as good results in using a weak solution.

Mr. Munson: I have used Bordeaux considerably, but I have never used it stronger than six pounds of sulphate and six pounds of lime, and I would like the best method of preparing the lime. Is milk of lime as effective?

Prof. Taft: I generally recommend a little stronger solution than I use myself, for the reason that where one has sprayed year after year there are fewer spores, and a weaker solution will answer. I am sure that Mr. Munson could use a solution half as strong as the beginner. But I never come down quite so much as that, in our own spraying. You will find that you will have far less trouble the year after spraying than others who have not sprayed at all, and of course a weaker solution would answer. Regarding the use of lime, I would say I have found that the best way of preparing it, if large quantities are to be used, is to slake the quantity wanted for use for the week, or for months, if you care to keep it. I slake perhaps half a barrel and do it carefully, avoiding burning or putting in water enough at one time to prevent proper slaking. In using a few pounds of lime, and throwing water on by the pailful, you are likely to prevent its slaking. By taking a quantity, you obviate this difficulty, and there is far less danger with half a barrel or a barrel than with less. I slake that and keep it just moist, a paste, and just covered with water. At the same time that I want to spray, or the day before, I take, say, twenty-five pounds of the copper sulphate (I use it in the pulverized form) and place in a piece of burlap or an old basket and suspend this in a barrel of water. I like at least two gallons to every pound. I suspend it so that it is barely covered. You will then have the clear water around it, and this will dissolve a certain amount of copper sulphate. This solution being heavier, drops down, and so it goes, and finally we will have it all dissolved and in shape to use. The common way is to take the right quantity of lime and the proper quantity of solution and put them together and dilute. The trouble with that is, as you have probably found, the material being quite heavy, drops to the bottom, unless kept in motion. You will find that if you slake your lime and dissolve the copper sulphate, and dilute each of these—for instance, if you wish to make fifty gallons, dilute each to twenty-five gallons, and then pour them together, stirring as you pour, they will stay in suspension far longer, and it is only a slight amount of trouble, and will save a good deal of difficulty in keeping it suspended. If you wish to make fifty gallons, and have your solution all ready, take six pounds of copper sulphate and four to six pounds of the lime mixture and add enough water to make twenty-five gallons of each, and pour

these together, keeping them well stirred, and then stir after they are poured together. There was a question about the lime, and I will answer that by saying that you should have about so much lime in the mixture. It takes from four to six pounds. I have two or three tests which I use to ascertain about the lime. One test is by what the chemists and drug-gists call "yellow prussiate of potash." It is a chemical you can buy. A piece as large as a hickory nut will be all you will need in a year. Place this in a bottle holding three or four ounces of water. When you have put your lime and copper sulphate in, in what you think are about the proper proportions, drop in a little of this solution. If you haven't lime enough, you will find that this light yellow liquid will make a very dark brown spot—sort of mahogany brown—very distinct. That means there is not lime enough, that there is some free copper. To remedy this, merely add more lime. For safety, even if I found my test worked all right, I would add a little more lime, to make sure there was no free copper there. That is one test, and I think it is a good one. Another one is even more simple. Take your pocket knife and dip one of the blades in; and of course, if there is copper deposited on it, when you take it out, you will want more lime; it will indicate free copper. Let it remain in the liquid about a minute. Another test is to see if there is an excess of lime. You can take clear lime-water and blow into it a little while. The carbonic acid of your breath will make a cloud. You can take some of this Bordeaux mixture on a little plate and blow into it a few minutes, slowly; the lime unites with the carbon di-oxide, and forms a little film. If there is any free lime a slight film will be formed, indicating that it is all right. It shows that you will require no more lime.

Q. Is there any danger of getting in too much lime? A. Not if the lime is properly slaked and it doesn't bother the pump.

Mr. Smith: Do you practice spraying the peach at the college?

A. For curl-leaf, yes, sir.

Q. What is the disease that produces curl-leaf—is it a fungus? A. Yes, sir.

Q. Has cold weather anything to do with it?

A. Well, I thought so a year ago, but I am a little in doubt now. I think anything that causes a check to the growth is likely to bring this on, and a cold spell in the spring will check the tree; and in all cases fungus will occur, if it is warm and moist afterward. So, in our experience if we have cold spells that would check the tree, and after that a moist period and warm, we are likely to have the leaf-curl, which is caused by a fungus. Of course, there is another curl that is entirely distinct, but this fungus is almost the same as that of the plum-pockets—forming a sort of sack several times as large as the healthy plums at this time of year. They are hollow and generally of a whitish color. I would say that we have had very good success, the last four years, where we have sprayed for leaf-curl. This year our young trees were badly affected, but with the sprayed trees I have seen very little curl-leaf, hardly one affected leaf to the tree. We had a few trees which we generally spray but which we neglected this year, and these were badly affected, as are other trees, particularly young trees, in our section. Spray early, for this, before the leaves come out. The fungus winters on the old shoots, in the scales of the buds, and by spraying early and

using copper sulphate solution, that one spraying will do much toward reducing the injury. I always spray for leaf-curl at that time, and then spray the trees again, soon after they blossom, using Bordeaux mixture and Paris green.

Mr. Morrill: With nearly everyone who has a large amount of spraying to do, this matter of getting the lime into proper form has caused as much harsh language as anything connected with it, and the idea has been prevalent that we should strain it through something cheap, and it has been recommended that we use burlap. Burlap has considerable loose lint, it is an imperfect strainer at best, and it clogs nozzles and strainers, and a few of those things have caused a great deal of trouble. In our own work we use this (exhibiting a large funnel) and it can be made by any tinner. Use a twenty-four-mesh wire cloth and a copper or brass strainer, and then none of your materials can affect it; and when it has gone through there, not only your material is strained, but everything that will affect the pump is taken out.

Q. You strain the mixtures before they are put together, don't you?
A. I strain them right into my spraying tank.

Q. You don't put the lime with the sulphate first thing, do you? You strain them each separately?

A. My plan is to mix my stock solutions. I mix my stock solutions stronger than does Prof. Taft. I use a pound to a gallon. Then we put into our tank the regulation amount; although I use four and four to fifty, it makes a safe solution, and it has been perfectly effectual with me. In a fifty-gallon cask we dissolve fifty pounds of copper sulphate and in another stake fifty pounds of lime. We find in straining it that there is a great deal of waste, but we make sure of enough lime. Then we strain one of the stocks into the tank, filling up with water, and then the other stock is strained into the tank, in this way preventing the curdling of the mixtures. When it comes to the nozzle, those little soft lumps will bother; but by proper straining, and a little care in not straining the two stocks together without plenty of water, this can be avoided. This curdling we have found very troublesome, as it will pass the strainers and prove troublesome in the nozzle.



A TALK ON CHERRIES.

BY MR. STEPHEN COOK OF BENTON HARBOR.

I don't wish it to be understood that I know all about cherry culture or all about the varieties. It is true I know some things about it, but I am not so egotistical as to suppose I know all. Perhaps I may throw out a few ideas, from my observation and experience in my own locality. It is true that a certain cherry might do well in my locality and not in another part of the state. So what I have to say will relate mostly to our lake shore country.

The first thing is in regard to location. Now, there are some places where I would not plant cherries. I would not plant them in a hollow nor on wet ground—always avoid low ground. I do not say it is necessary to have a dry, sandy soil, although they will do well there; a good, substantial soil, if it is not wet, if it will produce good crops of corn and wheat, is a good location for the cherry orchard. It is a fact that a cherry tree will be killed by wet where a pear tree would flourish, or even a peach tree. I think the Mahaleb stock will stand wet better than the Mazzard, but I wouldn't advise any one to put a cherry tree on wet soil. On a dry clay soil, or where there is a slope, there will not be much danger. I have some trees situated like that, and they do well. At the same time, you can plant cherries on any elevated piece of ground and they will do well.

There is another difficulty, where you have a sandy knoll, for instance, where the sand is liable to be blown off. There is danger of the frost getting down so deep that the roots may be injured. I have seen cherry trees killed in that way. I have never had a cherry tree injured at the top, but there is danger that the roots may be injured. But by using Mahaleb stock that will be avoided. That has a very strong, tough root. In a locality like that, if a man is setting a cherry orchard on high, elevated ground, and it is sandy, and the sand is liable to be blown away, I should mulch the trees, mulch in the fall.

What varieties should be raised for market? Here will come a difference of opinion. For my locality, as some of the leading varieties, I should take May Duke first. That is between a sweet and a very acid cherry, of which Richmond is a type. May Duke is sufficiently acid for any purpose, and still, when it is thoroughly ripe, it is dark red and very fine eating. It fills the bill better than any one variety I know, for family use and as a fine market cherry, and I think when it is better known in Chicago it will sell as one of the best, though I find that the large black cherry will bring the most money in the Chicago market. The reason is simply this, that our cherries come into competition with cherries from California, and of course we know that those are large cherries. Now, if we are going to compete with cherries from California, the larger the cherry and the blacker, the better sale there is for it in Chicago market. A black cherry always sells better than a red and a red better than a light cherry, things being equal as to size, etc.

Mr. Smith: In regard to May Duke, is it not a fact that they are almost black when thoroughly ripe?

Mr. Cook: Yes, a dark red, almost black. Early Richmond could perhaps be grown all over the state—inland and everywhere. Perhaps it should be considered the leading variety for all localities. I don't see any on the lake shore, for May Duke will grow there, and I think surpasses it in every respect. It commences to bear with us at three years, and it grows faster. Some years it bears fuller than others. Black Tartarian is one of our leading varieties. It is put down as a large cherry, and there are few varieties which surpass it in size. Great Bigarreau will surpass it in size but not in quality. I have some seedlings that are fully as large. Great Bigarreau forms a large tree with a spreading habit, not quite so productive as I would like, but a fine-selling cherry. I don't like it on one account, though; it is not quite so productive as Black Tartarian. That is considered a standard of excellence. In Chicago a large black cherry is like the Crawford peach—anything that is a large yellow peach sells as a Crawford. So a large black cherry will sell as Black Tartarian. There are a good many other varieties I could mention—Yellow Spanish, Governor Wood, and several others, but I would not recommend them particularly. Of course we have English Morello, but it is worse than Richmond for acidity. I don't know but they would sell well in Chicago. It is a slow-growing tree.

Now, in regard to the pests of the cherry. The curculio will injure the cherry to some extent, though where I grow them, in the open field (and that is where cherries should be grown), they will not be troubled as much. They only trouble me where they grow near a piece of woods, or some other fruit row. As for jarring the cherry tree, I don't think it would be practicable. I think the tree would very likely die in a few years, from bruising of the bark. If the bark is injured it is likely to gum, and when it commences to gum it will die.

All the varieties I have mentioned will grow on the lake shore, and the May Duke will grow wherever peaches will. It is a hardy tree.

The curculio, as I said, works most along old fence rows or near the woods. Although the curculio goes into the ground after the cherry or plum is attacked, there it becomes a winged insect, and then, before the winter sets in, it seeks some place to spend the winter, and an old fence row or woods is the place for it.

Occasionally we have the aphis. That gets on the ends of the young shoots. Of course, I suppose they could be killed by kerosene emulsion; but the year they came so thick, they came all at once, on the ends of the shoots, and I was wondering what I should do. One day I was down on the beach, and there, where the waves washed it, I discovered immense quantities of lady-bugs. They were along there so thick you could see them rods off. They were washed up by the waves and lay there in rows. In a short time they were gone from there, and in a few days I discovered that some of the trees were literally covered with these lady-bugs, and that the lice very quickly disappeared. In less than a week you couldn't find one. They destroyed them at once. The lady-bug is one of the best friends the fruitgrower has.

Regarding stocks, I don't know whether that will interest you or not. I find there is quite a difference in the productiveness of cherry trees,

according to what they are worked on. It used to be the practice of nurserymen to work the cherry on the Black Mazzard stock. For several years past I have used the Mahaleb. I wrote to Mr. Barry several years ago, if that stock was good for the cherry, and if a tree budded upon that stock would be a long-lived tree, if it was hardy, and if the union between the stock and bud would be strong and permanent. He wrote me in the affirmative. Since then I have used that stock exclusively, because I bud some trees for my own use, and I am satisfied it is an improvement on the old Black Mazzard stock.

Mr. Morrill: Doesn't it dwarf the tree somewhat?

A. A little, but it makes a better tree and a better-shaped tree. That is my experience. Then there is another stock on which they can be worked to some extent—the wild red cherry, a sort of sand-cherry. The fruit grows about like a currant, same size and color, and is worthless. I have tried that to some extent, and of course it is very hardy; nothing will stand more than that will.

Q. Do you mean the sand-cherry or pin-cherry?

A. It grows on sandy ground along the lake.

Prof. Taft: That we call the pin-cherry, not the sand-cherry.

Mr. Cook: Perhaps that is the kind; it is very hardy, and some of our cherries will grow nicely on that stock. In regard to the Mahaleb stock, there is one thing I have been testing which may better the difficulty somewhat. Work them on the stock three or four feet above the ground. I had my doubts for several years, whether the union would be strong between the stock and bud. It will.

Mr. Morrill: Do you work by graft or bud?

A. Budding, by all means. In speaking of the Mahaleb, we take a tree six feet high, and bud from the ground—one-year-old trees for budding will do, and then cut the top of your tree off, where you want your top to form, and you will get it right there.

There is one phase of the cherry question which I take up last, which is yet one of the most important, and that takes us to the bird question. This year and last the cedar birds have come from the swamps in northern Michigan—or that is as near as I can ascertain their origin. They came in hundreds. Could any one here, Prof. Taft or any one else, give us a little history of that bird?

Prof. Taft: It generally stays here all winter, and often feeds on the cedar.

Mr. Cook: They seem to come from the north, and I have understood that they came from the cedar swamps where they build their nests. About the time the cherries are ripe they come by the hundred. Now, you know if a hundred birds light in a cherry tree, it does not take them long to destroy the cherries. The only remedy I could see was powder and shot, and I blazed away and killed some six or seven hundred, and with what my neighbors killed I suppose there were a thousand. Then suddenly they disappeared. It is a serious question with us, for they destroy from a quarter to a third of the cherries—in spite of all we can do. I am decidedly in favor of protecting the insect-eating birds—the robins, thrushes and cat-birds—I allow robins to build in my cherry trees—and consider all those birds a benefit to horticulture and agri-

culture, even if they do take a little fruit, for they do far more good than harm.

There is another idea I have, and which comes from my own observation. I have two trees of the Russian mulberry. Their fruit commences to ripen about the time that of the Black Tartarian cherry does. Just as soon as they begin to ripen, and they fruit for about a month, the birds will go there, these cherry birds—they will leave the cherries, as will the other birds, and congregate around those trees. I think if we would plant that Russian mulberry along the roadsides, and even among our cherry trees, it would be a great advantage. It would save all our fruit—raspberries and blackberries and all.

I am in favor of protecting the insect-eating birds, but the cedar birds, so far as I know—well, I don't believe they ever destroy an insect if they can find a cherry. I never saw one looking for an insect, but they are always looking for cherries. When a bird is of no benefit I know of no other way than to kill him.

Q. How about the Windsor cherry?

A. I have not tried it myself, but one of my neighbors had a few. It is a good cherry and comes about as late as the Great Bigarreau. There is another variety that ripens about the same time, which is worthless—a large cherry and valuable, but the tree is not hardy. It is called Elk-horn. The tree seems to be unhealthy. I think Windsor is a good cherry.

Q. What is the objection to May Duke cherry, if any?

A. I know of no objection to it in any way. I put that at the head of the list for our lake shore country. Black Tartarian and some other varieties, I put next.

Q. What about the Montmorency? A. I don't know anything about that.

Q. At what age does May Duke commence to bear?

A. Just as quick as it is large enough, and that is as soon as you want anything to bear. It will commence to bear when it is three years old and that is soon enough. You take a tree that is very small and let it over-bear, and you are getting fruit at the expense of the tree growth. It will bear at three years, and that is soon enough. It should be set on the Mahaleb stock. I wouldn't recommend any other stock. It dwarfs the tree a little but it is all right. I have trees fifteen feet high.

Q. Which sell best, sweet or sour cherries?

A. That depends on the size of the fruit somewhat. A large acid cherry will always sell well, if it has good color.

Q. Why wouldn't Montmorency sell—that is large—and the English Morellos? A. English Morello is very acid, a good bearer, and a late cherry, but it makes a very slow growth with me.

Q. If the fruit was picked off and it was not allowed to bear, would it not grow better, and attain size in four or five years? Then wouldn't it be as profitable?

A. The only advantage of English Morello is that it is late. It is a good bearer, but in the room of that tree I would take Belle Magnifique. It is a better grower, it is a red cherry and an acid one, though not so much used as Morello or Richmond. It is a good, acid cherry, and still a good eating cherry when ripe.

Q. At what age will Tartarian come into bearing?

A. About four or five years. Not quite so soon as May Duke, if they are on Mahaleb stock, because it does not bring them into bearing so soon.

Q. What about Governor Wood?

A. The great trouble with Governor Wood is that it rots so badly. That is one point in setting an orchard, which I forgot, the liability to rot. Take, for instance, Hale's Early peach. I have had those on top of a dry knoll, where they would not rot at all, and on a level they would all rot. Just so with any kind of fruit. Get it up on high ground and you won't be troubled with rot.

Mr. Juan Hess: I wished to speak more particularly of the time of coming into bearing of Black Tartarian. My experience has been fifteen years. I have understood that it would not bear until fifteen years, but would bear every year after that.

Mr. Cook: I think that is a mistake. I have never found any difficulty with its coming into bearing after it was four or five years old. But of course those I speak of were worked on Mahaleb stock.

Mr. Hamilton: I think that the experience of our lake shore coasts north is not like that of this gentleman, that Black Tartarian, Yellow Spanish, Governor Wood, and May Duke all take longer to come into bearing than the gentleman has mentioned. I think, however, that they are largely on Mazzard stock, and that perhaps is the cause. I am glad that the gentleman called attention to the question of stocks. The Mazzard stock will throw up a much larger and quicker growth, therefore I think that the nurserymen have largely grown their stock on the Mazzard, and I think that the slow bearers are largely due to this cause. I am very glad that growers have begun to notice the difference, and will hereafter ask for their cherries to be budded on Mahaleb stock, as I think they always should be.

Mr. Morrill: They don't sprout from the root so badly, do they?

Mr. Hamilton: I think not at all. The old variety, grown from sprouts, always spread badly, but I have not noticed that they spread so much from Mazzard. Mahaleb doubtless is the stock upon which to bud cherries, to get fruit. It dwarfs the tree a little. With us English Morello is a very slow grower, but I think we allowed it to come into bearing too soon, and I believe that hurt it. With the experience we have had, we would use Richmond, Montmorency, and English Morello, the three great market cherries. That would be my choice. I have named them in the succession in which they would ripen.

Mr. Cook: In regard to this, perhaps we have no better authority in the United States, on trees, than Mr. Hill, and he says he is using Mahaleb stock for cherries.

Mr. Smith: I call Mr. Cook's attention to one question—whether there was any objection to May Duke cherry, and if so, what? It seems to me there are several things. One is, that the fruit ripens unevenly; sometimes there will be one limb on a tree that will be half green when the balance of the tree is ripe. This is peculiar to that variety. I don't know that it is a serious objection. But there is another thing, black knot. I would like information in regard to it from some of our scientists here. It is a thing peculiar, with me, to May Duke. I have some black

knot on one May Duke cherry tree, and have been obliged to cut down one or two every year in consequence of the enormous amount of black knot. It finally kills the tree, although it is one of the best dessert cherries we can grow. That is an objection. Whether it is our locality or a peculiarity of that variety, I don't know. That is the reason I wished to call Mr. Cook's attention to the matter. I don't know of any remedy. If there is any preventive or remedy, our professors here can probably give us some information.

Mr. Cook: Was there any plum tree that stood near this tree?

A. Some of the trees are close to plum trees and others are away off—twenty-five or thirty rods—and there seems to be no difference in regard to black knot. That is, those that stand away from the plum trees have even more than those nearer.

Q. You have kept black knot down on your plums?

A. Yes, and I have tried on the cherries, but it outgrows my capacity. It is worse on cherry than on plum trees.

Mr. Hess: With me, May Duke seems to be failing at fifteen years old. They are not so healthy as the other varieties. English Morello, with me, was a failure. My experience is similar to Mr. Cook's. They do not seem to grow and do well.

Mr. Cook: That is the first intimation I ever heard of black knot on May Duke trees. I have seen May Duke over twenty years. Where did your trees come from?

Mr. Smith: They were there when I got the place. It must be something peculiar to the trees. I have raised trees and set them out, and have never seen a particle of black knot. I had heard that in the interior of the state there was some black knot on trees that had stood in the neighborhood of plum trees, but I did not know that there was any black knot here, on the cherry trees.

Mr. Morrill: There was one question asked, and I would ask Prof. Taft, Mr. Hamilton, and Mr. Cook to answer it as briefly as possible. Of the three stocks, pin-cherry, Mazzard, and Mahaleb, which would you advise?

Each answered, Mahaleb.

Mr. Morrill: Then the inference would be, with three authorities favoring Mahaleb, that if we get cherry trees we should ask for Mahaleb stock.

Mr. Merry: I have some cherry trees. Is there any way of knowing on what they are budded? If I wanted to purchase, how would I know whether they were budded on Mahaleb?

Mr. Cook: The men who take care of them ought to know. The nurseryman who buds his own stock can tell you. No one can make a mistake when he sees the tree. The Mahaleb stock has a large root. Mazzard has a little tap-root with a few little rootlets, while Mahaleb has a large root, two or three times the size of the root of Mazzard.

PESTS, NEW AND OLD.

BY PROF. L. R. TAFT, AGRICULTURAL COLLEGE.

In giving this subject to the secretary, I had it in mind to go a little outside of what we usually think of as pests (generally of the animal kingdom) and include some of the diseases. By including two or three of each class, I can perhaps give you some points of value, for the reason that during the past two or three years we have had brought among us quite a number of new and troublesome pests as well as diseases, and, so far as my experience goes, there have been few years when we have been more troubled by new insects as well as old than during the past spring.

Of the insects which have, within the past two or three years, been brought particularly into notice, there is nothing more to be feared, I think, than the one known as San Jose scale. We do not know just where it came from, but it reached us by coming across the mountains from California, and now it is on its way back home again. It has reached so far west as our own borders, upon its return, and though I do not now know of a single tree in Michigan infested with this insect, still I should not be at all surprised if there were large numbers of them, from the fact that for the first year or two it is not noticeable, and it is not until the third year, when the tree is dying, that it comes to the attention of the owner and he attempts to ascertain the name of the insect.

You can judge of the danger from this insect when you realize that three years is sufficient for it to destroy a tree, particularly if the tree is young; and more than that, it is to be feared because it spreads rapidly. While it has no means of locomotion from place to place, in itself, it is carried by the birds and in various other ways scattered from tree to tree; and, once there, it multiplies rapidly. It has been learned that if every individual developed during the season should attain its full size and develop itself, we might expect something like four millions at the end of the season from a single one in the spring; but, of course, they do not all mature, by any means. But, with this very rapid development, you can see that a single insect on a tree would soon be able to do great injury. It is a really terrible insect—terrible not only because it kills the trees, but because, when it has gained a lodgment on a tree, sufficient to be observed by an ordinary person, the injury by that time might be sufficient, and would be on a young tree, to forever blight any hopes of fruit from it.

It is a sucking insect—it punctures the bark and sucks the juice; and the sap thus taken, and the injury made by the insect in the bark, would be sufficient to prevent any further growth. This insect has been found in many places in Ohio, in at least a dozen localities, and the trees nearly all trace back to one or two nurseries in New Jersey and possibly one or two in New York. There is some doubt about the trees from New York. It is possible they came indirectly from New Jersey; so far as we know, at least, there is no nursery in western New York that is infested.

There have been nurseries on Long Island, and along the river there have been a few cases, but the western New York nurseries, so far as I have learned, have escaped. I think, too, our Michigan nurseries are free, but there is a chance that this insect is scattered about on some of the trees planted during the last six or seven years. I think it would hardly go back of five years; but, if any of you have bought trees from New Jersey, I would advise looking them over carefully.

When it becomes numerous on the trunk it gives the appearance of coal ashes daubed on. On examination you will notice that each of the scales has a minute depression on its center and upper side, and you can see with naked eye the scales. Many of them are of black color. With a small glass you can easily make them out, and you will generally find, where this depression is, a yellow spot. Here is a sample (exhibiting a small branch) of genuine San Jose scale. It has been thoroughly soaked with kerosene oil, and with the glass you will be able to examine the scale.

As to the remedies for this. If you have a young tree that is at all badly diseased, I think the most prudent thing would be to take the tree out at once and burn it. If you have only a few insects on the branches, you could cut the branches back and destroy them, and treat the trunk of the tree so as to probably do away with further harm. Fire is perhaps the best method, but next to that is whale oil soap in water, using a pint and a half to two pints of soap to the gallon, and thoroughly scraping the tree, if it is a small one; or if larger, by thoroughly spraying it and repeating this process after the lapse of a week. If a single scale escapes, the chances are you may have a thousand or a million at the end of a few months. This remedy, if brought in contact with the insects, is effective. The kerosene emulsion is also good but perhaps not as good as the whale oil soap. If the leaves are off, make the emulsion twice as strong as usual—one part to eight of water. That, particularly if you repeat it, would also destroy them, and I would certainly, on account of the great danger, advise everyone who has trees from any of these eastern nurseries, to look over any such which have been put out within the last five or six years; and if you find anything which looks like the specimens here, if you will send a specimen to either myself or Prof. Davis, at the college, we will tell you what we think of it.

There is another insect which has been troublesome in some sections. I brought along a little twig with some on. It is the common brown plum scale, different from San Jose scale but may prove equally destructive. This is more likely to occur on trees which have been neglected and in dry seasons, but it is seldom very injurious to trees which are growing properly, and the remedies would be the same as for the other. In fact, for any of these scale insects, there is nothing better than whale oil soap or kerosene emulsion. Recollect that with these Paris green would have no effect, nor with Bordeaux mixture. The scale must be killed by direct contact, and Paris green has to be taken into the system to have any effect.

I meant to allude to another form of pest, which came from one of the lake shore counties, and I wish to speak of it from the fact that you might mistake it for San Jose scale. It is very much like it, but not so injurious, and still it is to be feared. The same remedies may be applied

for this. The insect is somewhat longer and larger than the other one, and I think you would be able, with a little examination, to distinguish it with the naked eye.

There is another insect which is becoming quite troublesome, and possibly to be feared fully as much as either of those mentioned, from the fact that it works under ground. During the last few years the fruit-growers in Delaware and New Jersey, especially, have been greatly troubled by what they called yellows, which in this case was not true yellows. It did not exactly have the appearance of yellows, and when they came to examine it they found the roots covered with black aphis. During parts of the year they appeared also upon the young twigs and branches and leaves; and, as many nursery trees have come from these sections, we have frequent reports of their presence in this state, and trees attacked have in most cases died as a result. The insect is much like the black aphis, spoken of on the cherry, but it is distinct from the other varieties of aphis, and being underground it is of course very hard to treat. The trees you purchase from the nurseries, particularly from infested sections, should be examined and all insects upon the roots destroyed. We resort again to the same remedies mentioned for the scale insects. Either dip the roots in kerosene emulsion or in whale oil soap solution. Either of these would destroy the insects, if the trees be left there a very few minutes, and if your emulsion were properly made it could be used without harm. When it comes to treating the older trees, we have more trouble. Of course, those on the branches would yield, but when they have grown two or three years it is difficult to reach the insects; and, too, in that case, the chances are that the trees have been so injured it would not pay to bother with them. As to remedies, I would suggest, in sections where you can get tobacco stems readily, that they be used. In them you would have a cheap and effective remedy, by scraping back the soil down to the roots and spreading there a layer of tobacco stems, using from a peck to a bushel per tree, according to size of the roots; and then, unless the soil be very moist, soak it with water. Or, if you prefer, you can make a tea, steeping the stems, and apply the water from this source. The tobacco water would be the safest and best remedy. Kerosene emulsion could also be used, and in some sections they have made use of potash salt; but the trouble there is that, unless you use a liberal amount, it does not kill the insects, and if you use a little too much it kills the trees; so I scarcely like to recommend that, if there is any possibility of saving the tree. You can use this at the rate of one thousand pounds to the acre, and if you figure out the number of feet your roots occupy, you can use it without much danger. If you permit this to come in contact with the roots directly it will be pretty sure to destroy them. These are some of the most troublesome of the recent insects, and the remedies are about the same for all. I might mention one or two hundred of these scale insects, and the same treatment could be recommended for all.

There is one insect which is an exception, the pin-hole borer of the peach, the one which mines the trunks of the trees. It is a small borer which works its way around through the wood and in time destroys it. That being understood, it is difficult to in any way fight it, and the only thing I could recommend, if you know the insect is in your orchard, if

it has begun to work there, is to treat the whole orchard, to prevent its entering any of the other trees. We found, two years ago at South Haven, a single tree in an orchard, showing the work of this borer, and to prevent its spread the trunks and branches of all the other trees before the first crotch in the trunk, were treated with a wash containing a large amount of lime, and with lye. You can add wood ashes as well, and Paris green. We have used in that case, for a barrel of water, from a peck to a half bushel of the lime and wood ashes. We keep it well stirred and then we add, for the thirty-two-gallon barrel, one quarter of a pound of Paris green, and in some cases I have used carbolic acid. I think this is of the least value, and it should be carefully used at best, and perhaps the wash would be as well without it. It depends so much on the strength of the acid that, as a rule, we mention only the harmless materials already recommended.

This same wash I have used on other trees to keep away borers, and simply used more water.

Q. How do you apply this? A. Put it on with a stiff brush or an old broom. In regard to killing the borers, I think it is a good plan to go over the trunks of trees at this time of year, and use something of this kind, or to take the common lye, prepared lye, and add to that Paris green, and possibly carbolic acid, and dilute with water and apply with a pump. You can spray the trunks and branches; and, unless you have observed the effect of this, you will be surprised at the smooth and healthy appearance of the trunks.

Q. In what manner does the insect make its appearance, the pin-hole borer?

A. It is a little beetle, about one-eighth of an inch long. It bores all through the wood; little pin-holes inside the wood.

Q. I have seen some trees in my own orchard where there seemed to be an insect which would work in and go clear around the tree on the inside. A. Sometimes the ordinary borer will do that, but this goes all through the wood, this pin-hole borer. Regarding another difficulty with which we have to contend, I have brought with me some twigs of trees from Casco. This disease is something that is proving very troublesome there. It is nothing new, but has been very troublesome in sections of New Jersey and Delaware, particularly, and is generally called "crown gall." It usually appears on the crown, but sometimes on the stems. This generally appears first on the roots, and a tree planted with a number of small galls is pretty sure to die within a couple of years. Don't mistake this gall for the very small ones which often appear on the roots. These are entirely distinct, but nearly as troublesome. Those are caused by little worms, and appear all over the roots. These are just here and there, but they are mighty in the end, particularly if they are at this point (indicating the crown of the roots) or on the stems. The question comes as to what causes them. There is no reason, so far as ascertained, to show that they are of a fungus nature. Possibly they are. More than that, it is not, so far as can be learned, the work of insects. What has done it? It has long been well known in Europe as well as in this country, and twenty years ago a German botanist experimented with some trees, and he was able to produce the same effect, galls which were in every respect the same as these crown galls that I have here. He found that by taking

a tree which was just coming into growth a few degrees of cold were sufficient to cause this swelling or similar swellings on the various trees. Quite a large number of plants of the rose family are troubled by this. I sent some specimens from these trees to Washington, the other day, and that is about all they had found out there, at the department of agriculture. They referred me to this German, with whose work I was already familiar. This disease attacks the apple and plum and peach. The grape, of course, is out of the family, but I have frequently seen similar injuries to the grape, and it is thought that this same development, where there had been some little break in growth by frost, was brought about in that way.

Q. Do they come on blackberry roots? A. Yes, there is one like this, and caused in the same way; another is caused by the gall insect rather than by frost.

Q. Would it be any benefit to cut them off? A. No, not even if it has only a small hold. I would advise throwing it away—burning it might be best, for it is possible it may be contagious. So far as is known, however, there is no other cause which can produce it, except freezing when the tree is growing; before it ripens in the fall, or perhaps in the middle of May, the injury is most likely to occur. If you can be sure to cut off all of it, it might be possible to save the tree.

Mr. Smith: Will this appear on the body or branches of the tree as well as on the crown? A. It will attack it anywhere. There is one on the root (exhibiting sample). This one came from Grand Rapids. The other two were from Casco.

I would like to show you the tests I spoke of this morning, as many of you have not seen them, and to make it plain to those present, I have taken, there, a solution of copper sulphate. There (extending another vial) is a little of the yellow prussiate of potash I spoke of, for a test, to learn if you have a sufficient quantity of lime in Bordeaux mixture. Now, that is the solution of copper sulphate, and of course has the color you see. This has a yellowish color. A drop of that upon this, produces a marked effect, a brown effect, the same as in Bordeaux mixture. This will not be quite so marked in Bordeaux, but whenever you find that this material will produce a brownish color you will need put in more lime. The other test is simpler and requires merely the use of the pocket knife. If you find a film of copper deposited over the knife blade, it certainly is pretty good evidence that you need more lime.

Q. Is there danger in having too much lime? A. No danger, but it is not well to use more than is necessary. I always use a slight excess to make sure—that is, a little more lime. If the knife shows any copper, that indicates that copper is present in a free state, and you should add more lime until that deposit is not seen on the steel.

Q. In that other test, you put in lime until you can no longer see the brown color? A. Yes, and I add a little after that, so as to be sure. I think it is safe to add a little lime always, even after the test shows that the copper is neutralized.

Mr. Sherwood: Is it absolutely necessary to have the lime (if you make a solution of fifty pounds) mixed so it is all free in water? You slake fifty pounds of lime and put it into fifty gallons of water, and you have

limewater. Is that limewater, which is practically clear, just as effectual as if the lime particles were all mixed?

Prof. Taft: I would wish to stir it up and mix it thoroughly. Along that line, I would say that, to get the best results, the best way is to dilute each one-half—dilute the lime you wish to use, and the copper sulphate, and then stir them together gradually, and you will find that they will not go to the bottom so fast as if you make a straight solution. Dilute each before mixing.

Mr. Boynton: Providing you are using copper and Paris green, and you apply this lime, does the Paris green have just the same effect on the insects that it would if you added the lime? A. Yes, but the copper sulphate with the lime has a different effect on the fungus. The Paris green does not affect the lime at all, except that, if there is any free arsenic, it unites with the lime and prevents burning the foliage.

Q. Do you advise mixing the lime and copper sulphate before you put on any water? A. No, I dilute each before I mix. To make fifty gallons, as an example, I would take five pounds of copper sulphate and have that dissolved, and add to that twenty-five gallons of water, and then mix them.

I might speak of a method for a large orchard. I have a tank which holds fourteen barrels, and when we are spraying, we put in anywhere from eight to twelve barrels, according to the condition of the land. The bottom of the tank is half round, so we can cramp and turn under it; it has a cover, and those working the pump and applying the spray stand upon this, bringing them up about five feet; and then, with the extension rod, they are able to use the Vermorel nozzles on any ordinary tree, and apply the spray thoroughly. The driver handles one of these lines of hose, or one of the extension rods on which there are one or two Vermorel nozzles. One of the men holds the bar and the other the lines. You have seen some pictures where they are fenced in, but these two men, having the supports they do, can drive over rough ground, and are not troubled with being thrown off the tank. These two men are able to run the team and pump and four nozzles. This tank, holding the quantity I mention, enables you to spray two to four hours before going back to reload. With large trees, you have to go back pretty often unless you have more than the ordinary amount in the cask. We generally go to the smooth and level ground while the tank is full, and to the uneven ground when the tank is nearly empty. This tank is very valuable, because the movement keeps it well stirred up, and we are not at all bothered with settling.

Mr. Sherwood: Did you ever make Bordeaux mixture the day before? A. I don't like to, but we make the stock solution a week in advance.

Q. Did you ever have any left over night, and have it crystallize? A. In that case, you generally have not enough lime. The copper sulphate, if you have used more than one pound to a gallon, will drop to the bottom and crystallize if it stands any length of time. We have had no trouble at all, because I always try to clean out each day and start fresh in the morning. It is just as effectual, except that it settles to the bottom, and it is difficult to keep it in suspension afterward.

Mr. Winchester: What varieties of tree does this California scale attack?

A. Almost all kinds of tree. So far as I know, there isn't a thing it does not attack. I should fear almost any tree I had—certainly all fruit trees, and all plants except the strawberry.

Mr. Graham: What means should we employ to protect ourselves from these scales and from the aphis? We have already had the aphis shipped in here. A carload was distributed throughout Kent county. You can not see that with the naked eye. They were discovered merely by accident. The man who bought them thought he discovered an odor of carbolic acid on the trees, and he investigated.

Prof. Taft: In that case you could not do very much, if you did not know it was there; but with all the danger we have, I think we should have a quarantine law, compelling all trees to be examined and passed upon by competent authority. It seems to me, too, our spraying laws should cover this class of insects, from the fact that they are far more likely to do harm than those we have been spraying for in the past.

Mr. Smith: One of my neighbors has a plum tree which was full of blossoms this year. Instead of there being plums on it, it was a kind of sack which sometimes had an insect in it and sometimes not. There wasn't any seed.

Prof. Taft: I spoke of that this morning, the plum-bladder or plum-pockets. It is caused by something like the same fungus which causes leaf curl of the peach. It is almost the same fungus. Where a tree is badly infested you wouldn't be able to save all your fruit next year, probably, but by all means pick off and burn all those which develop, and spray the trees to destroy the spores. The next spring, give them the ordinary spraying that you would for that or anything else—spray in the spring before growth starts, and again as soon as the blossoms have fallen, and after a year you should be entirely free from it.

Mr. Judson: Is the spraying law enforced? A. I am sure that the agitation over that law has led to increased spraying. So far as I know, however, no cases have been brought under the law.

Mr. Graham: In Kent county the law has been enforced in a small way.

Mr. Sherwood: Could this trouble mentioned this afternoon be avoided by dipping the trees? A. I would certainly always do that.

Mr. Graham: The trouble is, they are not observed by the ordinary man, neither the aphis nor the San Jose scale. We do not examine them, and nothing calls our attention to them. Now, it seems to me there should be some quarantine or something of that kind to prevent the introduction of these pests into the state. Other states have such laws, and it seems to me if anyone should take action in that matter it is the State society; it should push the matter and have some action taken, either by resolution or some other way, to prevent the introduction of these pests into the state.

Mr. Morrill: When we get oranges in this market from California, which have live scale insects on them, isn't there a strong possibility of our introducing scale in that manner?

Mr. Graham: Certainly, there is great danger of it. Many of our plants are different from those in California, but unquestionably some of our plants would be troubled by the scales that come from there. I am

sure it would be well to have a quarantine law against insects in any form being introduced into the state, and while it would be difficult to enforce a law against scale on oranges, I fear there is great danger from that source.

A Voice: It is claimed that San Jose scale will not flourish in our climate and latitude.

Prof. Taft: It has been found in Ohio, pretty well up to the Michigan line.

Q. Was it flourishing? A. Yes, sir; I saw a tree in bad shape. That tree came from New York; but, as I say, it might have come indirectly from New Jersey, perhaps, and it grew there in Ohio three or four years. When I saw the tree it was coated three feet from the ground as if it had been covered with coal ashes.

Q. What part of Ohio? A. Northwestern Ohio, near Toledo.

Mr. Morrill: I think the suggestion of Mr. Graham is one to which in course of time we shall have to come. It is easier to prevent the invasion of such enemies than to get rid of them after they are established, and it is well to be prepared. It can only be accomplished through some organization. The present yellows law was drafted at a meeting of the State society, and became a law and is a very good one. It seems to stand the test. The spraying law originated with Mr. Graham, or the society with which he is connected at Grand Rapids, and is starting out in very good shape and will prove an excellent thing for the people. The quarantine law will certainly be hailed with joy by nurserymen of this state; and if inspection was required, trashy stock would not be sent here so freely as it is. California ships her fruit all over the United States and to some foreign countries, but they quarantine strictly against any stock from outside the state. It is all examined by a paid inspector. Their law seems to stand, and there is no reason why Michigan, now being reasonably free from such things, should not remain so.

UNIFORMITY OF PACKAGES—THE NEW AMERICAN FRUITGROWERS' UNION.

BY HON. R. D. GRAHAM OF GRAND RAPIDS.

For the 20th of May was called a meeting of delegates from the various states and from the provinces of Canada, to assemble in Chicago for the purpose of organizing a National or American Fruitgrowers convention. I was sent as a delegate from the Grand Rapids Fruitgrowers association. Those present represented, I think, nine states; California was represented—that is, southern California; the Orangegrowers' exchange was represented by their general agent; the Oregon Fruitgrowers' union was represented, and the Chautauqua Grapegrowers' association; Illinois had two representatives, Kentucky one, Missouri was represented, and Michigan. Georgia was also represented, by Mr. John B. Cunningham, who was the originator of this movement.

In Georgia they have a union handling practically all the fruit of the state; in Oregon the same; in southern California the union handles the fruit of that section; the Kentucky people are with the Georgia and Missouri people. Their fruit has to go long distances, they have long roads over which to carry, making the expense something of which we know almost nothing.

The matter was discussed pro and con., showing the advantages of their local organizations. We had several papers on the different topics, and I took more or less part in the discussion, of course; but though we finally organized the association, I could see no great advantage to the Michigan people in joining it. It is, by the way, an association of associations. Each state or province is eligible to membership; not local associations, simply state or provincial associations can become members.

The circumstances of fruitgrowers here in Michigan are very different from those of the majority. We are located between the best markets in the world—Chicago and the great northwest on the one hand, and the east and south on the other. With the states I have mentioned it is different. The gentleman representing California said he handled 600 carloads of fruit for that association. Mr. Fay of the Chautauqua Grapegrowers' association said he handled 400 carloads of grapes in one year for that association. The idea of the National association was to make something like a clearing-house for all local and auxiliary associations to report to. (Here Mr. Graham read a letter from Mr. Cunningham, describing part of the work.)

It seemed to me all the way through this meeting that it would be far better policy for the Michigan dealers to organize themselves into one strong association for self-protection, but perhaps I may be wrong.

In regard to uniformity of packages, the expression, it seems to me, admits of a great many constructions. What is meant by uniformity of packages? Is it that apple barrels shall all be of one size? I should presume that is what it meant, not that peaches should all be shipped

in bushel baskets, grapes all in eight-pound baskets, or anything of that kind. There has been something said, in fact I have heard considerable, regarding an ideal package for fruit. For instance, Michigan apple barrels to be all according to one standard, the Michigan peach baskets to be all one kind, always the same the world over, and so on with all the packages. It occurs to me that uniformity in this sense is desirable. For instance, the Chicago market, perhaps, demands a fifth-bushel package for peaches, and don't want anything else. The Buffalo market, for instance, demands a bushel basket. On the other hand, fancy fruit should be put up in a fancy package, while for the very common fruit, intended for the canning factory, a larger package is more suitable and less expensive. I don't believe in shipping a fancy grade of fruit in rough baskets or a poor grade in fancy baskets, nor even in small packages, where the expense of the package is almost equal to the value of the fruit. I believe this idea holds good regarding all fruit packages. Then, too, I believe that the market to which we ship should control this—their ideas must be complied with. It is so in other lines.

I was talking the other day with a representative of a Chicago packing-house, and he told me that they put up the hams from that house in twelve or thirteen styles. One market wanted one style and another another, and they couldn't get the prices unless they catered to the wishes, whims, and fads of the people with whom dealings were had.

On the other hand, I believe a bushel basket should always be a bushel basket, and contain fifty pounds, as the laws says. An eight-pound basket must hold eight pounds, and not six, eight, or ten. Uniformity in that sense, I believe, is desirable; and as I understand it, that was the object of the law enacted at the last session of the legislature. That law emanated from a fruitgrowers' association, an Allegan county horticultural society. It was brought in there by their representative, and at first view it seemed to me that we were going a good distance out of the way to enact any such law as that until there was a demand for it or a big complaint from the consumer. There certainly was never any organized effort on the part of the consumer to have such a law enacted, but in talking with the legislators it was evident that it was simply for the protection of the honest growers and packers of fruit, the idea being that the majority of people, fruitgrowers and packers, wanted to do the honest and straight thing in packing their fruit, wanted to give an honest package, but once in a while an individual would put on the market a "snide" package. Instead of the eight-pound grape basket, he would get one that held a little less, and put it on the market and sell it as an eight-pound basket. By and by the other packers and growers find it out, and they get some of the same size, or a little smaller, and pretty soon the package that was "snide" will be the standard, and so on down, until we get them down in some instances so that the package is worth more than the fruit.

I understand that some of the package manufacturers object to this law and declare that they will defy it. It seems to me that this is entirely out of place, and that it is the duty of the fruitgrower and packer, and horticultural societies throughout the state, to demand enforcement or recognition of that law, coming from them as it does. All that it requires

is that each package shall be stamped in pounds and ounces its capacity, so many cubic inches for a pound.

Yesterday, in talking with one of the manufacturers here, he claimed that the rule was not correct. If they followed out the rule, the eight-pound basket of today would have to be marked ten pounds. I don't know whether that is correct or not. However, even if it was true, it would make no great difference. If it is true, it is easily mended.

The idea that the package manufacturers are coming before the people and saying that they are going to disregard that law, which was enacted at the suggestion of the horticulturists of this state—for these basket manufacturers to say to the people, "That law is not good and we will sell you our baskets without the mark", it seems to me that they are assuming a great many more functions than they rightfully have. If they are not satisfied with the law, let them take it to the supreme court and make a test case of it. I believe in enforcement of that law, and I believe that we will have uniformity of packages when it is enforced.

DISCUSSION.

Mr. S. H. Comings: The last remarks of the gentleman are a little suggestive. There are some people who defy the law who are called anarchists. There are other people who break the law continually, and we call them by a more respectable name. I have an idea that corporations which defy the law are the most dangerous anarchists we have. I have talked and thought a good deal about this package law. There is one law which should bring about a reform, and that is the law of profit. I have traveled a little in the northern part of this country and have always become acquainted with the fruit commission men, and everywhere I have gone Michigan fruit is at a discount. It is as true as you live. Michigan apples and Michigan fruit are at a discount, as compared with other fruit. It is caused in some cases by careless packing, but in a good many cases by dishonest packing; in some cases from a thoughtless use of "snide" packages, and in many cases the determined use of them. There are two influences pulling us toward these "snide" packages. One is that the manufacturers sell more packages, when they contain less, and the transportation companies, if the package is twenty-five per cent. smaller, get twenty-five per cent. more for carrying the fruit. So, with the price of our fruit growing less and less each year, we are putting a larger percentage of money into the package. Ordinarily, when goods grow cheap they are put into larger packages, to save cost of packing and freight. Our own interests should lead us to maintain this law, and induce us to adopt larger packages; and for the sake of maintaining our reputation in other markets, we should have uniformity. New York and Ohio fruit will bring more, just on their reputation. They say the packing is guaranteed by an association, and the people have a reputation for putting up uniform packages.

Mr. Reid: One objection to this package marking is that it contemplates that the package shall hold ten pounds, level full, while if filled up to the extension top it would hold more than that. But that

really does not touch the merits of the case. They can be packed level full, even with the extension top. The main object of securing a uniform package is accomplished, whether the weight varies or not. If they are not full, the consumer can see it; if they are a little more than full, he will be all the better pleased. I have heard it stated that the Wells-Higman company of this city have determined to ignore the law. There will be trouble for them in Allegan county if they persist in this.

Mr. Graham: It seems to me that such a manufacturer is not only ignoring the law, but the interests of his customers, because every grower is liable. I was glad to hear Mr. Comings speak of the quality of the fruit as well as the packing. I don't like to say anything about it, it is rather like taking my cue from the politicians. If one wants a nomination, or to stand well with the people, he talks about the corporations and the railroads. I have been doing something of the same kind. I have been giving it to the basket manufacturers and saying nothing to the people about the deceptive manner in which the fruit is packed. But it is the truth when Mr. Comings says that Michigan fruit is in discredit on account of the manner in which it is packed. It is not a matter in regard to which we can very well legislate—more is gained by educating the people. It is not a question of dollars and cents in the way of profit, but in the way of loss. There is no man, who expects to stay in the business, who can afford to pack fruit in a dishonest manner.

Mr. A. J. Merry: In regard to the quantity of grapes we are to put into a basket, we go to the manufacturer and buy an eight-pound basket. We expect that basket will hold eight pounds. If I wish to ship ten pounds of grapes, I must have a basket that will hold ten pounds, and it seems to me that the kind of fruit ought to fill each basket by using the number of pounds it is marked. With the peach, of course a bushel basket might be made to hold fifty pounds of peaches, and we could take those dimensions and call it a standard bushel; but with grapes, when I buy a ten-pound basket I want one which will hold ten pounds.

Mr. Morrill: I think possibly we are liable to be misled on that idea. The marking will simply indicate what that is supposed to hold; the packing will readily indicate to the buyer what it does hold. That is, if there is an eight- and a ten-pound basket, side by side, and not marked, the buyer frequently purchases one package thinking he is getting the other; but if it is marked, he knows just what he is getting. Consequently I do not think we ought to throw up an obstacle of that kind.

Mr. Merry: I bought on one occasion what we called a ten-pound basket. It does not hold much more than an eight-pound basket. My neighbor thereupon goes down and orders a special make, takes it home, puts ten pounds of grapes into it, and marks on the cover, "ten pounds of grapes guaranteed." There isn't any mark on mine. He had a special basket made; it was a little too large; the ten pounds did not quite fill it, but I can't get ten pounds into mine.

Mr. Morrill: But if you have a package that is marked, and your neighbor uses a package that is marked in the same way, neither will be at a disadvantage.

Q. But if this law is enforced, he can get a larger basket if he wishes.

Mr. Morrill: Yes, but the package he does get will indicate the amount contained. It simply says to the buyer, "This package contains so many

pounds." The differing products, with their varying weights, will cut a figure only by guaranteeing the fact that all packages stamped alike are of the same cubic capacity.

Mr. Graham: Suppose a package was marked, "43.1 cubic inches." It is something people know very little about, how much 43.1 cubic inches are; but if you say, "This is a ten-pound basket", "This is an eight-pound basket or twenty-pound basket", everyone knows what that is. The effect would be just the same as if the law said, "A certain size of package shall be marked No. 3." Then, if a man went into the market, he would know every time that a package marked three would be just the same as one he bought last year, marked three, so far as its cubic capacity is concerned. One gentleman manufacturing baskets told me that a year or so ago he had a trade in one town of three carloads per week of grape baskets, and it lasted two or three weeks, then stopped short, and he did not know what was the matter. He went to the town, and there learned that someone had introduced several carloads of baskets which held three quarters of a pound less. His trade stopped entirely. Today that smaller basket is probably the standard size there.

Mr. Reid: In making up the schedule for that law, the ten-pound basket was designed to hold one fifth of the Winchester bushel, so as to make as little change from the standard fruit package as might be. The marking of the package "ten pounds" is conventional, but it provides a uniformity which is desirable.

Mr. Morrill: I think, gentlemen, that you can readily see the point. Michigan is getting to a condition where it produces an enormous amount of fruit. We must begin to handle it in carloads. Buyers are looking for that trade everywhere, but they are not looking for it in a place where, when they order a thousand baskets of grapes or peaches, they don't know what that means. If they order a thousand fifth baskets of peaches, and it means fifths, sixths, and sevenths when they get them, they are not going to deal there. Other places are taking the business we should have. If the buyer can sit in his office and can telegraph over here to the head of an organization, "We want a carload of apples, standard barrels and standard packing," and a man can quote back a price to him, and furnish the fruit immediately, even if collected from a dozen people, and that fruit opens up exactly as the buyer expects, you at once have a trade established. Now, where in Michigan can we do that? But when you have established a standard, and keep working to it, with the transportation facilities you have (unequalled by any fruit-growing state in the Union), you have the key to the situation. Until that is done we are all at sea. I am sorry that, with 500 fruitgrowers in the vicinity of St. Joseph and Benton Harbor, there are not more here. I wish they were, for all this is a matter of self-preservation. I venture that, unless some calamity happens to our fruit, within ten years many of our people will find it difficult to pay their taxes; many perhaps will go out of the business in disgust, unless they are willing to use business-like methods, as do other business men.

Mr. George Comings: I hope this resolution will be passed, and that there will be a strong effort made by the fruitgrowers of Michigan to insist upon the marking of packages.

The handling of the grape crop, as it has been done in the past, was a premium upon the using of small sizes of basket—there was no question as to whether it held nine or eight or ten pounds. The basket was cut down so that the last size would hardly hold six pounds of grapes. While I haven't talked with all the buyers, I have with some, and I don't know of a buyer but was dissatisfied. I think there is no question but St. Joseph and Benton Harbor grow as good grapes as anywhere, and can command as good prices, when we are in position to guarantee commission men good packing. For a number of years the New York people have used a basket commonly known as the eight-pound basket. Here in St. Joseph we have been foolish enough to cut our own throats by using smaller sizes, guided principally by the manufacturers, who are willing to make as many packages as possible; and I wish to urge the fact that there is an immense crop before us, and already a strong combination has been made by the manufacturers on the price of baskets. There is necessity for putting our product into larger instead of smaller packages, and let buyers know they can come and buy in car lots, and that there will be uniform packages and packing—packed in the best manner possible.

Mr. Sherwood: One of the advantages of organization, it seems to me, would be that the product of all the members of the association would be guaranteed to be in a certain size of package and packed in a certain way.

TRANSPORTATION AND DISPOSITION OF FRUIT.

BY PRESIDENT MORRILL.

I believe we are approaching the time now, very rapidly, when the state of Michigan will need much better facilities for distributing fruit than at present, and a considerable improvement in transportation, in certain directions, especially rail transportation. Our Grand Rapids friends have done a good deal and we have done little here, owing to our good boat service and the convenience of our market, Chicago. Altogether, I am impressed with the idea that that very convenience, the easy way we have of getting rid of our fruit by boat service and commission consignment, has led us into a rut which, I fear, will swamp us. There are men in this room who have sold their fruit to much better advantage by reason of their having gotten out of this very rut of which we are talking. This year the ordinary market will be running over, within thirty days, and from then until snow flies, if no accident befalls the crops. Many places and many means of distributing the fruit will be neglected, because we will wait until the last day. The strawberry crop is but a foretaste of what there is in store, and I think the situation is about the same all over the state. Now, it does seem, if we can not organize, we must begin to do a little thinking for ourselves. There is no use saying that the proper way is to have a good, safe organization in which each man can do his part honestly and fairly and trust each of his neighbors with at least half as much confidence as the commission man he never saw. That seems to have been the difficulty in this and nearly

every locality in the state of Michigan. A few men see the necessity of organization. They attempt it and a few more join them, and really think, under the inspiration of the moment, they ought to be real honest and trust one another. They look into one another's faces and say, "Here, we have lived together a good many years, and this man has always been all right and the other man is all right," but the day it comes to putting the fruit together, and trusting one man, who is equal to the task, and paying him what he is worth, it seems like too much money to give him. But the commission solicitor who has never seen our faces, nor we his, nor have we heard of his firm—he may come to us and take a hundred dollars' worth of fruit and we do not even take the pains to go to Bradstreet and see what the man is worth or whether he is in existence; and this and every other consigning vicinity is full of men who have lost consignment after consignment by that very lack of ordinary business prudence.

Now, this can all be avoided. I have talked it so much that it seems very stale, though I have not tried to say much about it the last few years; but I do hope something may be done. There is a nucleus of organizations in various parts of the state. By means of these organizations, if they are a success, the grower could demand facilities for transportation, and secure means of distribution which you have not now, and one of the simplest ways is to take up this idea of uniformity of packages. Make "snide" packages so obnoxious that no man can stay with you and use them, and then you can bring the buyers to you. There is no simpler nor better way than that.

Grand Rapids people have done this, until their commission men are largely on the street they sell on. They return a new package to you for the one in which you have your fruit, and you go back home with as many empty boxes as you brought full of fruit, and a check in your pocket. I will guarantee that in Grand Rapids, where the transportation would naturally be higher than with us, their average profits were larger than ours. Not only larger, but considerably larger, on the same product, the last two years, simply because there was an organization there, built out of the wrecks of three or four others. The growers are working together and have secured some transportation facilities that we have not yet thought of, by rail. Of course, they have no water.

A state organization, such as Mr. Graham has suggested, would certainly be a useful thing, but I have an idea that it would take pretty rapid work to get one into operation now, in time for this year's work. It is not necessary to go into that in detail, but I wish to make that suggestion. This uniformity of packages is a necessity. We have a law, and two firms have been mentioned as signifying their intention not to comply. If you had a strong organization and you would say, "We buy of so and so, because they comply with the law, and Wells-Higman have refused to do so," you would not have to go through the supreme court. There is an easier way than that. They would mark their packages. My idea would be, if these two men have declared themselves in that manner, that every fruitgrower who means to do right should say to these people, "We won't touch your packages, because we have other ideas."

Organization, too, will help us on the transportation question. If you have stuff enough to do business with the railway people you can go to any company and get fair rates. On some lines they have a minimum rate, now, of 200 bushels of peaches. An organization has secured that, no individual could, and it gives them a chance to make smaller shipments to these points than they could do by schedule. Much has been accomplished in that way, and can be here, and the markets will come to you, to a great deal larger extent, if you get this idea of uniform package and uniform packing thoroughly instilled into the minds of enough people so they can come here and do business.

DISCUSSION.

Mr. Rood: Mr. Morrill's ideas, as usual, are quite to the point. We have altogether too easy ways of selling our fruit. I pack my fruit and put the cover on, and put it on the dock, and it is done. The result is, that our selling ability withers, as a man's arm would if he put it into a sling. We are not sellers. I am in favor of the idea of organization, but there are difficulties in the way I can not see through. Some time ago, I was talking to my brother in Chicago, and explaining some matters in our business. We talked in a vague way of co-operation, but the difficulty is to find the man to head it. We have had organizations, and there is usually some one out of a job who is willing to head the organization, but some man who is not qualified to do it. If we could get some man who could and would take care of our crop, we could combine, but that difficulty has always been too great for us to overcome. I feel the force of what has been said. It won't do to dump the entire fruit crop into Chicago this year, but I don't know what else to do, even though I know that means suicide. Now, if there is any way out, we want it. I am ready to do anything in reason to form an organization which will help to better this matter. I am heartily in favor of seeing the package-marking law enforced, and we can enforce it by refusing to buy of firms which do not comply with the law.

Mr. Stevens: Why wouldn't the plan adopted in Grand Rapids be beneficial to the people in St. Joseph and Benton Harbor? Why can not you encourage the buyers to come here? We believe that through the organization in Grand Rapids we increased the number of buyers at our markets last year to quite a large extent. I know of several instances of buyers who stayed right there and bought fruit, who never appeared on the market before. I sold peaches all one week to a man who had never appeared on the market before. He bought my peaches in the morning and another load for the afternoon. I got my check for the two loads every day. That was done, I think, through the organization of the fruitgrowers' association, by encouraging the buyers to go there and look at the fruit before it was packed. I don't know why that system could not be adopted here. We have these buyers come to us, and if we don't wish to sell to one we sell to the other. I know, in my own case, I had a load and I was offered a certain price; and I said, "No, I want more money." "Well, we can't give it." I hung on to my load awhile. The

same house was represented by another man. This man came along and offered me ten cents per bushel more. "No, I want such a price." By and by a third man came from the same house, or rather this time it was the proprietor, and he offered me five cents per bushel more than his house had offered the first time. Finally I got within five cents of what I wanted, and fifteen cents more than I was first offered. We encourage the buyers to come to us.

Q. If they don't come, what do you do? A. Well, we did it, and did it through the organization. The commission men in Grand Rapids went so far as to buy up some of the outsiders, so that they should stay out of the market. They said to these outside men, "We will buy for you; we can buy cheaper than you can," and in one or two instances these outside buyers paid them five or ten cents per bushel to buy for them. It is a very rare thing for a Grand Rapids grower to consign his goods. We wouldn't want to send them away. We are more afraid to ship than you are to trust the Michigan man to buy direct. You could hardly get any of our people to ship last year. One Detroit firm stayed there and bought during the entire season. The commission men tried to buy him off, but he said no. One of the firms said to him, "You stay away and I will buy your fruit as cheap as you can." He said he would give them a trial. He stayed off the market, and this commission house bought the fruit. He went to the commission house and asked what they proposed to charge him. Ninety cents, they replied. He said, "But I could buy them for seventy cents." The next morning he came himself and bought.

Mr. Morrill: The Grand Rapids growers adopted a form which they use as a letterhead. It is an advertising scheme in which they, in their business, call attention to what they do. Mr. Munson has one of these with him. It is a cheap and easy way of letting people know what you have. Of course we have buyers. You can find fifteen or twenty and up to a hundred, almost any time, but we want more.

Mr. Munson: Four years ago we formed our society, and I was elected secretary, to serve two years. Of course a great deal of the work falls upon the secretary, so I worked out this plan: I wrote to commission men in the large cities all over the country where we are likely to ship; I sent one of these return postal cards, asking them to give me a list of all their reliable commission men or merchants, in their place, and this return card was directed to myself. Almost invariably we received a reply. To these men was sent a circular something like this (exhibiting a large letter sheet). Upon one side we give our connections from Grand Rapids, the time for leaving of the trains, freight rates from Grand Rapids to their place, for car and less than car, and by express. Each state is arranged alphabetically. On the other side is a letterhead we use in our correspondence. Our commission men are not commission men, they are brokers; and nine tenths of the fruit in our section is sold on our markets. Last fall we had from five to twelve, and one morning fifteen, thousand bushels of peaches on our market. One reason why men from other places say they like to go to Grand Rapids is, several concerns will send a man there and keep him the whole season, and he can buy a mixed assortment of fruit and vegetables of all kinds, and they claim that they can buy such a load in Grand Rapids better than in any place they have ever been in.

Mr. Smith: Do you have any local inspection of your fruit before it is shown? A. The association does not in any way take charge of selling the fruit. Every man is for himself. They are not responsible for it in any way. Every grower makes his own bargain and sells his own fruit. For years we have provided a room down town, where outside buyers can go and repack their fruit, if they wish, repack for shipping. We keep a stock of baskets on hand to sell at reasonable cost to those who wish to buy covers, etc., and fix up the purchases. The fruit, when it comes on the Grand Rapids market, is not covered, and a great deal of it is shipped in that way.

Mr. Morrill: The expense is very small, in this matter, to each individual, and the results probably are beyond computation. If they had made no effort to call attention to their fruit they would not have been nearly so well situated financially as they are today.

Mr. Munson: Our expenses are generally less than \$200 per season. I think last year we had about \$150. Our rules are that it costs \$1 to be a member and \$1 extra for every thousand bushels of peaches, or the equivalent in any other fruit.

Q. The membership runs a little over 400? A. No, not that is paid in.

Q. About what proportion of your fruitgrowers are members of the association? A. I presume not over one third. Most of the larger growers are. There is always that tendency to shirk even one dollar of expense. The others reap the benefits as much as those who pay the dollars, but we do not pretend to furnish them circulars or give them references; and yet, in an incidental way, they reap the benefits.

Mr. Smith: This transportation question is properly a local one, and inasmuch as we have no local organization it is utterly useless for us to expect great benefits from any system of this kind. For twenty years we have tried and tried to move in this very direction, and we have so entirely lost control of anything like organization, that we are simply at the mercy of every one who wants our fruit, whether in Chicago, Milwaukee, or anywhere else. Our friends in Grand Rapids have their organization, they worked the thing up and they will stick to it, but we can not do anything until we have more confidence in each other than we have shown heretofore. We will trust any one rather than ourselves. We will trust commission men in Chicago or Milwaukee, whom we have never seen and never expect to see, but we won't trust one another.

Mr. Munson: We find in Grand Rapids that it makes a great difference where we are backed up by the association. Instead of being short and crusty, these people would invite us into the office or to make some appointment, and then they would talk it over and help us in every way possible, give us every privilege they could. Sometimes it would be only a better privilege in regard to loading, or a more convenient time of leaving, and sometimes it was more, as in the case of the peach rates. The cut from a rate and a half to one rate originated in our society, and it was two or three years before we got that; but we kept hammering at them all the while until we finally got it, and now it is only one first-class rate. That has helped our town thousands of dollars every year.

Mr. Morrill: It has been intimated that this is a State Horticultural society and not a local affair. I would like every one to understand what we conceive to be the duty of the State Horticultural society. It is an organization which is supposed to be advancing the interests of the locality where it meets, and to do its best to assist the growers there, and to provide the best information we can secure, by inviting people fitted for this purpose, from all over the state. We are just as heartily in sympathy with your interests here as we would be with those of Grand Rapids or Oceana county if we were there. That is the mission of the state society. Of course, I am a resident here, but many of these other gentlemen who are giving suggestions may be doing it to the detriment of their particular society. Mr. Reid has a letter here from Mr. Barnett, a pretty level-headed fellow generally, and he may have something to suggest.

Mr. Reid: It seems very strange, when they can maintain organizations in California and New York successfully, that such ventures in Michigan seem to be largely failures; and while they have a measure of success at Grand Rapids they are yet in the infancy of what they will probably be able to do. This matter has been discussed here, ever since I first heard Mr. Smith talk, and that is ten or twelve years ago, and very little has been done. I don't expect much to be done until men are compelled to resort to this means. So long as peaches sold at \$2 or \$3 per bushel, men were willing to pay fifty cents express charges, but the time is coming when a gradual reduction of margins will compel people to resort to sales through organization. I sent Mr. Barnett a copy of the programme of this meeting. He sent his excuse for his inability to attend, and then wrote as follows:

Commerce may be defined as "the exchange of merchandise on a large scale between different places or communities; extended trade or traffic." Without merchandise there can be no exchange; without the means of transportation of that merchandise from one place to another, there can be no exchange. The two elements are indispensable, and the relations they bear each other are so close that the success of the producer of merchandise often depends on the quality and cost of transportation of his products to the point of consumption.

Manufactured articles, when the cost of the manufacture or labor has been a large factor in the production, as a rule can bear a heavier rate of carriage than raw material, so that the matter of transportation is not so important in many lines as it is in the branch of commerce the National League of Commission Merchants represent.

Dealing largely in the products of the soil, that are practically "raw material," the cost of transportation often determines whether it is profitable to produce an article.

No matter how prolific the soil, nor with what ease a given product can be grown, if the cost of placing it on the market exceeds largely a fair proportion of the price realized, the venture will surely be unprofitable. And that this is a reasonable and common-sense view of the subject, an illustration will show.

Suppose we take the item of apples, and the city of St. Louis as a market. Let us assume that \$2.25 is the market value of a barrel of apples weighing one hundred and fifty pounds net. From a point 200 miles in any direction, on a trunk line of railway, it is fair to assume that a freight rate of 16 $\frac{2}{3}$ cents per hundred pounds is the ruling rate, or 25 cents per barrel, or \$40 per carload for a minimum weight of 24,000 pounds.

It will be admitted by most producers that a price equaling 83 cents per hundred pounds for the fruit at home will be profitable.

Another grower 2,500 miles away, on the Pacific slope, can produce apples in unlimited quantities, but a freight rate of \$1 per 100 pounds leaves him no margin on which to operate. But no one pretends that a transportation company can haul a car load of apples 2,500 miles as cheaply as it can 200 miles. The compensation must in reason be in proportion to the service rendered, and not always in proportion to the needs of the shipper. A grower in southern Florida can not expect the transportation charges on a bushel of beans from his section of the country to New York to be the same as from Charleston, S. C. The needs of the owners of the railways are entitled to some consideration.

I would not lose sight of the element of justice in the matter of transportation. In fact, I strongly insist on it, and believe a spirit of fairness should obtain all through. What I strongly contend for is justice to the shipper, which he often does not get. Time is an important factor to us in our line of business, and the classification sheet is arranged with this fact ever in mind, by the authors of that compilation, and they are always railway men.

Speaking of the classification committee reminds me that the continual change in value of products makes a revision of the tariff sheet and changes in the rating of commodities a necessity if justice is done to the shipper. The intent of the men who fix the rating is no doubt good, yet a revision is necessary, as an illustration will show: Twenty years ago, pears were worth in the markets from \$4 to \$7 per barrel, as against \$2 to \$2.50, the selling price of apples. This year, the average price of pears has been scarcely \$3, while apples have sold at about \$2. In case of the hardy LeConte and Kieffer varieties, the price has been even less, scarcely ranging above the selling price of choice apples. Yet our western classification committee have a rating that makes the cost of transportation nearly double on pears than it is on apples.

The improvements in transportation in time, and the use of refrigerator cars, have reduced the risk to a minimum, and the roads are further protected by a release and guarantee of freight charges, so that there is now absolutely no reason for the great discrimination against pears as compared with apples. The same remark will apply to sweet potatoes and quinces, although the difference is not so great on these items, but vigorous protest should be made and concerted efforts put forth to secure a revision of the classification, and put these things on an equitable basis.

It is well to remember that for the transportation of all perishable products a much higher rate is always demanded, because of the "time" factor that is supposed to enter into the question. This higher rate is cheerfully paid on that basis, but railroad companies expressly exempt themselves from any claim for damages for failure from any cause to fulfil their part of the contract, although exacting the higher rate for their supposed liability on the contract. This is not just; it is exacting pay for a contract unfulfilled.

Grant that in the majority (the great majority) of cases they do meet the time—understand they are paid extra for it; and the Pittsburg, Cincinnati, Chicago and St. Louis railway (which is a part of the Pennsylvania system) frankly says: "It has two different rates of charges for tolls and transportation charges upon certain articles, viz., one higher rate, upon payment of which it assumes the ordinary liability of a common carrier upon its line of railway, for property transported by it; and another lower rate, at which it transports for all those who release it from all liability, so far as it may be lawfully done, for any loss or damage to property entrusted to it for transportation." This release is "From all claims, demands or liabilities for any loss thereof or damage thereto howsoever occurring, by fire or otherwise, or whether by negligence of the said railroad or transportation companies, or of their or either of their officers, agents, or employees, or otherwise, while the same is in their care, custody or possession."

This surely is comprehensive enough, and in case of damage fully protects the company, notwithstanding that the lowest rate is based on a supposition that green fruits are extra perishable, and a high rate is always placed upon them.

The time has fully come for a demand for a shipping contract that will insure delivery on time, or promptly compel payment of damages. This will be a simple measure of justice between both parties.

I fully recognize the fact that the League is comparatively small in numbers, that our organization is yet in its infancy; but conceding these points, still we

are looked on as the only body that speaks for the producer—the widely scattered growers—and we are asked to point out the way for changes and reforms in practices that oppress the poor and weak.

Monopolies are cruel, and would crush the life out of opponents, and it is left for us to initiate the measure that will bring relief. When a measure is planned, carefully considered, and advocated, the agitation that can be carried on by our local organizations, the influence that can be brought to bear on freight solicitors, on local agents, will after a while be felt by the general agents of the roads, and the persistent work will be effectual.

The boycott is an ugly, un-American word, and I will not use it, but content myself by saying, "Commerce will follow the lines of the least resistance."

If a puffed-up, self-important man be in charge of a transportation line, he is offering "resistance" to traffic, that will in the end be felt. I know of one trunk line between the east and west, magnificently equipped for business, that can not get a pound of freight from some heavy shippers, simply because of the pig-headed policy of those in charge of its interests. It is scarcely felt now, but will be in time to come.

Where a road has a positive monopoly, it may for a while pursue the "public be d—d" policy, but it will not win.

One trunk line leading into the City of Chicago, possessing all the material advantages that it is possible to imagine, for twenty years acted on that line, but every advantage was taken of competition, and every pound of freight that could go to competitive points went by other lines, till the management saw their folly and quietly changed their methods, until now no road will do more to accommodate its patrons than that line.

It is not the matter of transporting the goods alone that enters into the problem—terminal facilities are requisite, and decent treatment at the terminals. Every reasonable facility to promptly handle the goods should be afforded as a matter of right, not courtesy, and we should demand, and are entitled to, recognition as honest men.

We do not object to reasonable safeguards against imposition, on the part of the companies, but do object against unnecessary delays and vexatious regulations that are unnecessary. They are "obstructions to commerce" that should be removed.

Briefly, then, let us demand just service for compensation paid, the quickest time for the transportation of perishable products, the prompt removal of all obstructions to commerce, or go around them and pledge ourselves to persistent agitation, and work for the accomplishment of these objects.

I can not go into details or illustrations in a brief paper, as you all have daily illustrations of the points indicated. The report of the transportation committee will have additional matter on this subject, that will develop the ideas above set forth. Better to confine ourselves to something specific, and work steadily for its accomplishment, than to scatter our efforts until they are of no avail. Discussion will bring out points and illustrations to emphasize the above, for from practical experience we must draw our arguments to convince our railway friends of the justice of our claim, and I believe what I have said will indicate the course we should pursue.

FUTURE OF COMMERCIAL FRUITGROWING.

BY PROF. H. E. VANDEMAN.

I had no thought of having the great pleasure of meeting this society, when I left home a few days ago. I went over to Chicago to the nurserymen's convention, and, having found an opportunity to slip over here, have done so. I had no thought of saying anything on the topic which had been assigned to Mr. J. H. Hale, and which he, before all men in the country, is able to handle. But the future of commercial fruitgrowing is a topic which comes home, not only to the commercial fruitgrower himself, but to all the people in the country. The merchant and the consumer are both intensely interested in this subject, though you, of course, as commercial fruitgrowers, before all others. Now, we know that commercial fruitgrowing has been carried to such an extent already that some people seriously doubt the advisability of developing it further. A great many say, "Why plant more, there is too much now; the markets are loaded down," and such talk as that. We hear it very frequently. I have heard it from every section, from California to Maine and from Florida to Minnesota, and there is no doubt that in many cases commercial fruitgrowing has not been profitable, and we might say there is a dark future for it; but if we will only take the matter into more serious consideration, I think we can see that there is a bright prospect for the commercial fruitgrower. But it is in following just one line that it may be said that there is this bright future, and that is in doing it most thoroughly and in raising a high grade of fruit. The market will, in a hundred years from now, I suppose, be loaded down with trash. It is very rarely that we can find a market burdened with really good fruit; and that brings us to the question, How are we going to be able to grow good fruit? I think it is a question easily answered. If we will do as some are doing, after having made a good selection of locality and of soil and all that sort of thing, and then do as Mr. Hale and Mr. Morrill are doing, for instance, cultivate thoroughly and thin severely and fertilize abundantly, there is no doubt that we will come out in the right place.

A great many, when they have planted their orchards, have given them common cultivation and think they have done their duty. They think any one who would take pains to go twice each week over his orchard with a cultivator of any kind was expending an undue amount of labor. That is not true; it is a great mistake. I venture the assertion that if there were not a bit of rain from now to the time peaches ripen in August, Mr. Morrill would have a good crop of peaches in his orchard. If there were not a single drop of rain from now till then, I will venture that under the cultivation he is carrying on neither the trees nor the peaches would stop growing, and they would mature in fine condition. I don't know how many of you have seen that orchard, but I am certainly very much pleased to have seen it myself, and this is only a sample of what

might be done by others. I hope there are others who are cultivating as thoroughly as he does. And then, he is not afraid to fertilize. I believe he says he puts on 100 bushels of unleached wood ashes to the acre. How many fertilize like that?

I was in one of Mr. Hale's orchards, some years ago, and he told me that in one orchard he had put \$2,000 worth of muriate of potash. It might seem that it would take a good deal of "nerve" to do that, but he got it all back again. He was not in it for fun. He was in it in a business way, and it is the way to do. If you don't feed your orchard it won't yield you an income; it can not, any more than a horse can do his day's work without being fed. Another thing, if you are going to work a horse next week, you don't wait until next week to feed him. You feed him this week and the week before and the week after, and then the horse will be in good condition. Get your orchards into good condition, beginning with the time you plant them, and keep them so as long as you have them in your care. Then your trees are getting ready to sustain the crop, if there is one.

Another point is this: there are a great many people, judging by the crops they grow, who grow more peach pits than anything else. There will often be a twig supporting five or six peaches, that should have but one; and that one peach, if the other five are taken off, will grow to weigh and measure nearly as much as the whole six would have done, and you get rid of the expense of making those five other peach pits; and they take away the manurial value of the land more than any other part of the fruit. So why grow peach pits? You know what they bring when they go on the market. Those six little peaches won't bring half as much as the one big peach would have brought.

Some one may say, "Well, I can not afford to thin; think how much trouble it will take!" Now, just think of it. You are going to pick them anyway, and isn't it easier to do it as Mr. Morrill is doing, to have some one jerk them off and drop them on the ground, than to make six different motions for those six peaches, to say nothing of the packing and marketing? Isn't it cheaper to thin than to leave them on? I don't think we consider that subject enough. Mr. Hale of Connecticut has thinned 600 acres of peaches this year. Mr. A. T. Hatch of California, who was the pioneer of this peach-thinning business, says that he began his experiments by taking certain rows. He would take off a quarter of the fruit from one row, and then he would leave a row without thinning at all, and then he would thin a larger proportion of the fruit on the next row, and then leave another row untouched; and he kept on that way until he took off nearly all the peaches from some of the trees. Then he weighed the product of these different trees and sold them on the market, separately, and he found that about a fair rule to follow was to thin the peaches so that the Chinamen (they use them there) could spread a hand right between two peaches, leaving a space of five or six inches between the fruits. We might think that was very severe thinning, but I think you will find by observation and experiment what the result of this thing is.

This is the sort of commercial fruitgrowing that will pay, not only with the peach but with the pear and apple and anything else. This same

objection in regard to thinning might be brought up with apples. "Do you think we could go over our apple trees and take off the apples?" But it is practicable.

It does not cost so much as to take them off after they are ripe. I don't say this from theory alone, because I have tried it myself in a small way. I have not had the opportunity to carry it out extensively at all, but I have talked with these gentlemen I have mentioned, and others. Mr. Powell of New York, for instance, thins everything on his place. Mr. S. D. Willard does the same, and all these successful men are in the thinning business, and they say it has paid them abundantly. If it will pay others, it will pay you. We have biennial bearers—we call them alternate bearers. Why? Because, as is their nature, they put on too big a crop, and you allow it to stay on, and it so devitalizes the tree that it can not do anything next year. The tree must rest. That is what makes a biennial bearer.

I suppose you have had spraying talked to you here. You have eminent men here, who have made careful experiments, and I have no doubt you have had it well talked up. You can no more afford to do without spraying than without the cultivator. It is just as much a part of the farm appliances as the plow or harrow, in this day and age of the world. You must keep up with the procession, or you will be left behind.

If I had but one piece of advice to give to any one in the commercial fruitgrowing business, I would say, do it thoroughly, and aim to raise only the highest grade of fruit, and you will be abundantly paid for it.

DISCUSSION.

Mr. Berekmans of Georgia: As we have not had any practical experience in fruit in some years, I do not think our opinion would be of any weight at all. I will say, however, that when we were in that business we found thinning fruit very successful, especially with the Japanese plums and the different varieties of peach.

Mr. Dunlap of Illinois: I have been waiting to hear from the Michigan men on this subject. I think they are much better posted than any one from Illinois. I will only say that the past season has certainly emphasized the fact that there is a financially successful future, for the commercial fruitgrower, even among the men of Illinois, who are engaged largely in apple-growing. We find that those men who went into the orchards of central and southern Illinois last year, and bought apples for sixty cents per barrel, have been selling them this spring as high as \$6 per barrel. The way to make the thing thoroughly successful, is not only to grow the fruit successfully but to market it successfully. It is fully as important to market it properly as to grow it properly. I think this point can not be emphasized too emphatically. We find, too, in Illinois, that the cold storage facilities have in the last few years been of great advantage to us. We can place our apples in cold storage after harvest, right from the orchards, and sell them in the spring without having them repacked at all. No expense except that of storing. I have found that some of the most important things we have learned in fruitgrowing have been emphasized in what we have seen this morning—thorough cultiva-

tion, careful pruning, and fertilization. With us we do not adopt the same systems that you do, but the methods are essentially similar. We do not find it necessary to use wood ashes in fertilizing, as much as you do. Our great fertilizer is clover and barnyard manure.

Mr. Henry Augustine of Illinois: I feel since taking that ride this morning, and observing how the people of Michigan treat their orchards, and the work they are doing, as if I didn't know anything; and I am glad a hundred fold that I came here, for I learned some things which will probably do me good when I need them. I have heard great stories of your orchards, and the work here, but the half was never told. In reference to the subject of discussion, I wish to say that I have, in the last two years, been more fully convinced than ever of the advantage of thinning fruits of different kinds, not only the peach and apple and plum, but many other varieties of fruit; and not only for the sake of maturing the present crop, but, as has been intimated, it prepares the trees better for future usefulness, and I am satisfied that we have never appreciated the value of that part of the work. I don't know that we do yet. I am sure I was in deep ignorance until a year or so ago, when my attention was called to the matter of thinning; and further, I am satisfied the great majority of us have not even yet a full appreciation of the work of cultivating, the necessity for thorough cultivation of our orchards. We observed that this morning. I noticed some orchards which did not promise so well, and they were seeded down in timothy. I don't think we saw a tree anywhere, under cultivation, but it was in a flourishing, healthy condition. I doubt if we appreciate the value of thorough cultivation as a fertilizer and as a mulch and everything else. People say, "Shall we mulch our trees?" Mulch them by thorough cultivation. President Morrill referred to what I thought of the prospects of this business in the future. I don't believe we are planting trees half fast enough to keep pace with the increased population of our country. Not only that, but, with the increased demand for fruit, I believe, as someone said before, the more fruit is eaten the more it is in demand, and I am convinced of that fact myself, that we are just beginning to appreciate the value of fruit. I would call your attention to the fact that, in a majority of years, not one person in ten, nor one in twenty, uses fruit as a daily diet; and when we get enough fruit so we can supply the whole country, even if we have to grow it a little cheaper (we can afford to grow it cheaper). I think when we do that we will begin to realize the real value of fruit.

Prof. VanDeman: There is one other thought I would like to mention, and that is in regard to one of the effects of spraying, which I think we often overlook. The spraying of trees or plants affected with fungous diseases makes the fruit larger and thicker and of better quality. I don't care if the spraying don't touch the fruit, it makes the fruit better because it gives the leaves an opportunity to develop the tree to an extent not attainable with diseased leaves. It makes the fruit larger and better in quality. We do not apprehend that at first, until we come to think about it. In a new country they can grow beautiful fruit, because they are not troubled with a myriad of diseases and pests which affect orchards in the older country. But they say now, in New York state, that with the recent information in regard to spraying they can grow just

as good fruit as they did fifty or one hundred years ago. It is so today in Michigan and everywhere else. You should not overlook the importance of spraying in order to keep the foliage in such condition that it may not only develop itself, but develop the entire organism of the tree, fruit and all.

Mr. J. J. Harrison of Ohio: My opinion is that there is no section of the United States so favorably located, particularly for the production of peaches, as this lake shore region. In my travels in California, two years ago, I tried to investigate the question whether they could compete with the east in peach-growing, and I fully satisfied myself that they could not do so, even if they could get them on the market in good condition. They are so far from the market that they are in the grip of the railways, the freights are extortionate, and they do not stand any chance with the eastern peach-growers, if they handle their peach orchards as your worthy president does his. I don't know of a single orchard I visited in California which was in every respect in as good shape as Mr. Morrill's orchard today. The trees are all pruned with a certain idea—to get them low-headed, broad, and open, and his cultivation is perfection. I really think you have the best show for making money, considering your great markets, of any section of the United States.

Mr. VanDeman: I hope you will pardon me, but there is one thought more in connection with the matter of marketing, which is well worthy of our attention. When you go into commercial fruitgrowing, it is money you are after, and the biggest money is in the fancy market. You know that California sends peaches and plums and cherries and other fruits clear across the continent, and they beat you here, right on your own ground, in Chicago, Milwaukee, etc. How do they do it? There is nothing very mysterious about it. In the first place, they take pains to produce the high-grade fruit we have been talking about, and then they fix it up in the nicest packages they can devise, and they wrap every pear and every peach, every fruit except cherries, in tissue paper, and some even have their brand printed on the tissue paper; and this fruit they send here and with it capture the fancy market. The way to beat California is to beat her at her own game. If it pays them to buy tissue paper and wrap their fruits, it will pay you. I would like to know if there is anyone here who ever tried wrapping fruit in paper and sending it to the market in fancy style?

Mr. Morrill: I don't believe any have tried in it Michigan.

Mr. VanDeman: I wish you would try it. It won't cost very much to send a box or two to market and see the difference in price. I don't care if you charge double price for the tissue paper and wrapping, and so on. Charge everything to the expense of the venture that you like, that your conscience will permit, and then make an estimate, after you are all through. I tell you solemnly, gentlemen, it will pay. Mr. George Powell of New York has been doing that, and he is going to do a great deal more of it. A number of growers about Newark, N. J., have tried it, and they say it is an idea which has been very valuable to them. If Mr. Morrill will wrap some of his nice peaches and send them to market in fancy packages, he will get the biggest kind of pay for them. One man said he cleared a dollar per barrel above all expenses on every barrel of pears that he wrapped, without difference in quality. Fruit which is wrapped

is of better quality than that not wrapped. It not only protects it from injury, but it will make it better quality. The wrapping retains the flavor. Why do the Florida people wrap their oranges? They wrap oranges with skins as thick as sole leather because it retains the aroma. With a pear, the longer that fragrance escapes the poorer it is. The peach, pear, or plum which is wrapped is better than if not wrapped.

Mr. Morrill: I was just wondering what the California pear would taste like if it were left unwrapped and shipped here.

Mr. Dunlap: Wrapping is a good thing for good fruits, but I was on South Water-st., Chicago, last year, and I noticed some handsome peaches in baskets; and I asked my commission man where those peaches came from. He replied, California, and they were being sold as Michigan peaches. The wrappers had been taken off, and they were selling them for Michigan fruit. So, though we might imitate California in some respects, don't let us imitate them in the quality of the fruit. In regard to commercial fruitgrowing, there will be failures in it in the future as in the past, by a great majority you might say, of the growers, and it will be because they have not attended to the essential matter of marketing their fruit in proper shape, and marketing it where it is the most profitable. That was illustrated last year, by the market in Illinois. Apples were sold so cheap in the orchards that the growers were almost completely discouraged. Handsome fruit was sold for fifty and sixty cents per barrel. The great bulk of it was sold for less than seventy-five cents per barrel. The buyers placed the fruit in cold storage and sold it later on, and doubled and trebled their money. That could have been done by the grower himself, if he had been posted as to the proper place to market that fruit and how to care for it. We should consider these questions if we are going to make the future a success.

Mr. Morrill: I would like to correct one impression that Prof. Van-Deman has, and that is that California does get our market away from us. I can find shippers here who, with peaches no larger, have received \$2 for California's \$1. Double the price, pound for pound, for two or three years, Michigan fruit and California fruit lying side by side on South Water-st., and we know nothing about the quantity that could be sold that way. There have never been enough first-class peaches to supply the demand, at prices far above the California fruit, and their transportation charges would be a good revenue for us. So, speaking for Michigan alone, I think the prospect for first-class fruit is as bright as it ever was, but the lower grades may not be so successful.

Mr. Graham: I don't know that I can add anything to what has been said here. I quite agree with Mr. Morrill and the others. There is now and there will be plenty of room and a good market for good fruit. I don't think, however, that the great majority of the people of Michigan are capable, with their present methods, of growing that variety of fruit. The location and the methods employed make them unable to grow that quality of fruit. We have heard a great deal for a long time about growing the best quality of fruit. At the same time we know that the great majority of the fruit grown today is only of very medium grade, and it is a question whether it is getting any better. The bulk of the fruit that goes into market is very common, ordinary fruit, and I am always sorry to see men planting large tracts to fruit where the location is not first-

class. We know that they have not the facilities nor the ability to produce the first grade of fruit. There can be nothing but failure awaiting them; the men themselves are not adapted to it.

Mr. Van Lindley of North Carolina: I think there has been enough said by Mr. VanDeman, how to make a market for fruit. If his instructions are followed I have no doubt you will have success. The plan he suggests is what I have been trying to follow, and I will say something of the manner of packing fruit adopted in North Carolina. We use what is known as the six-pound-basket crate; when full it weighs forty pounds. There are six baskets to fill, and they each hold about two rows of good-size peaches, and the bottom row is just as large as the top one, if you expect to have a reputation. In addition to that, we usually take two pieces of paper for each basket, just large enough to go down the side of the basket. The paper is slipped down on the side of the peaches, on each side, and when the basket is filled we put a few little twigs of the peach tree in with the leaves on. It is very quickly done, and we turn the paper over and pack them. Our peaches, prepared in that way, brought from fifty to seventy-five cents extra per crate, all season, and the market was practically glutted with good fruit from other sections. I suppose it didn't cost us ten cents more per crate, and it paid us fifty to seventy-five cents extra. We have a big reputation on our package and the manner in which we put it up, and I don't believe in the future we will have any trouble in finding a market for our fruit. Of course, the object is to have only fine peaches, and we expect to continue receiving fancy prices. The market never has been glutted with really fine fruit.

Mr. Brooke of Kansas: In Denver a man went into a packing-house and asked for Wild Goose plums. The packer didn't have any, but had some Oregon and Sand Hill plums. He asked the price. The Sand Hill plums were priced twenty cents per basket more than the Oregon plums. He took the Sand Hill plums. They were what he wanted, and though the Oregon plums were fine they were not worth anything except to look at. Another illustration of the same thing is this: There was a carload of apples shipped into Topeka, Kansas, one year when Kansas was out of apples. These came in boxes similar to those used for oranges. When they were opened they looked very much like oranges; they were beautiful apples. I obtained a few to take to a horticultural meeting, to show them. They were so fine that I didn't know what they were. I examined the box, and "Newtown pippins" was printed on it. The man from whom I obtained these showed me some other Newtown pippins. They were green, half the size of the others, and the only difference in the production of the fruit was this: One orchard was in northern California and the other in southern Oregon. The orchards were only two or three miles apart, but one orchard was allowed to take care of itself; the sunlight never got to the apples, and they came to the market inferior fruit. No one would take them to be the same variety. The other man kept his trees trimmed so that the sun colored the fruit. It was simply the difference in care, and I warrant you that one man received more than a hundred per cent. more than the other for the trouble he took. As to commercial orcharding, that is going to be a success, and Kansas is going to lead, at least in apples.

CAN THE APPLE BE MADE AS PROFITABLE AS OTHER FRUITS?

BY MR. R. H. SHERWOOD OF WATERVLIET.

Since the earliest history of man the apple has been a tempting fruit; consequently, the first tree was about the first creation, evidently being in the mind of the Creator among the highest and most useful to men. It has continued to be the symbol of prosperity and best guarantee of fertile soil, salubrious climate, and prosperous community. We admire and delight in the taste of the orange, fig, peach, pear, etc., but no other fruit is so universally liked and generally used as the apple. Why is it? we ask. Because we can obtain any flavor, nearly, that our fickle tastes may desire. We have the sweet, sour, and in fact any degree of flavor desired by obtaining the variety. We read that apples are our most healthful fruit. Doctors prescribe them, and we learn that chronic cases of kidney and stomach troubles have been entirely cured by using only apples. Those articles should be published for public benefit in every paper and on every bill-board and rock from the Atlantic to the Pacific, and from Hudson's bay to the gulf. Instead of reading numerous and effusive medical advertisements, when viewing the landscape o'er, either from train or wagon, ride or mountain view, we should read, "Apples—apples for complexion of ladies—red cheeks for the pale, yellow for the florid, russets for those desiring tan or freckles"; and "All ills that man is heir to can be agreeably and speedily cured by buying your winter apples of Tom Jones"—town of Michigan, New York, or Missouri.

Turning our attention to the mode and care given the raising of this profitable product, we know by observation that the apple orchard, generally speaking, is used as the hog lot and calf pasture, and all care given it is bestowed by one or the other of these kinds of farm animals; and upon questioning the owner as to why he did not trim up and spray his orchard to help the quality of fruit, his usual reply is that "it never bore any amount; 'bout enough for his own use and a barrel of cider; didn't have time to fuss with it, had to plow for oats" and "this spraying is all nonsense, just encouraged by book farmers and such"; he'd like to see the commissioners compel him to spray or cut any of his trees down for yellows; he would take a shotgun to them. So he pats himself on the back as being a man of wonderful judgment and business ability. In reality, however, he shows less sense than the Arkansan who never shingled his house, for one gave an excuse and the other has none.

There is no part of the farm that is usually so neglected as the apple orchard, even by our best farmers; and sometimes the most successful farmer in other branches loses, by his orchard being neglected, what it takes many times the same acreage to return to him. I have observed during the past few years, however, that, owing to the general depression of farm products, thinking men are becoming convinced that no labor on the farm is so well repaid as good care of our orchards. Trimming, spraying, cultivating, and proper care in packing fruit has resulted well to

those whose orchards have good and profitable varieties. I emphasize, profitable varieties.

We read in the "answer" column of our paper that some one is intending to plant an apple orchard and wants information as to the best varieties. He may live in Iowa, and is answered by a New England man who is well posted on the fruit that is best adapted to his particular locality. His answer comes in the next issue, to set Baldwins with a few other varieties for home use. Baldwins are set, and perhaps, when seven or eight years old, a hard winter leaves him the bodies of the trees for his firewood. Consequently he is heartily discouraged. Right here I would like to suggest to all prospective fruitgrowers that the best advice and direction can be obtained as to variety, etc., from a successful fruit-raiser in your own neighborhood, or rather, fruitgrowers. Talk to all who are raising fruit, and then you obtain information that relates directly to your own case and particular conditions. Then, we don't have to "cut and try" many times to our sorrow.

Can apples be made as profitable as other fruits? I answer, yes. My own personal experience will have to be submitted, so pardon the personality. I have forty acres of apple orchard; have cultivated from two hundred to two hundred and fifty acres in farm products, besides my orchards, rotating my crops and, comparatively speaking, successfully. By that I mean average acreage of all crops. I have made more money from my forty acres of orchard than all the rest of my farm. Last year it netted me close to \$55 per acre, and has run from \$40 to \$60 the past seven years, with one exception when I had only 300 barrels, owing to the continued rains during the blossoming season. Apples bear with quite a degree of uniformity for about twenty years, being among the longest to bear of all fruit trees. The average age of the peach is about twelve years, while here, where we have yellows to contend with, it is not more than nine or ten years; and the pear, we know, as compared with the apple, is shorter lived; consequently we understand the apple has more time to bear, and evidently results in being more a money-maker. Hardly any two men agree exactly in the care of an apple orchard, but in the main there are certain things that are required to accomplish results that are profitable.

Trimming and cultivating apple orchards I believe to be essential, although I do not advocate so severe pruning as some. I cultivate my orchards, plowing early in the spring, and then sow two bushels of field peas to the acre, for hogs, which are turned into the orchard about the first of August. It is my idea that hogs in an orchard during early fall or late summer are the means of destroying innumerable insects and worms that prey on the apples. The peas are useful in giving the hogs flesh preparatory to corn-feeding later, and the ground has received a fine mulching and fertilizing. The peas take very little nutriment from the soil, as they are air-feeding plants. This year I find that I will have to either prop my trees or cut my peas and haul them out of the orchard, as the trees are very low-headed, and limbs are on the ground now by the weight of the fruit. If not, the hogs will feast on too many No. 1 apples. In all truth, we should not cast pearls before swine; but when apples are considered, hogs are very particular to discriminate in favor of the best fruit, both in variety and quality.

Spraying I believe in, and have seen the benefits and realized that my apples last year were benefited, at a conservative estimate, \$500, by my spraying, using Bordeaux mixture. I have sprayed twice this year, and have been very thorough and particular that each entire tree was wet, putting from two to three gallons per tree. I intend spraying again later. In picking fruit I have always believed that it is poor policy to pile apples on the ground, even if on straw, and let them be exposed to the sun and rain. Last year I picked my apples and hauled them immediately to my barn, putting them in bins, each variety separate, with plenty of straw under them. They are then protected from the weather and from dampness of the ground. We picked 1,000 bushels in one day —sixteen pickers, two men with team hauling. I have a Farmers' Handy wagon with platform $6\frac{1}{2} \times 16$ feet, which holds forty bushel-baskets of apples. We christened it the "flat car." We hauled to the station, $2\frac{1}{4}$ miles, forty-five barrels of apples on it, and hauled them easily. At the same time of hauling our picked fruit, before the men commenced upon a tree, we picked up all windfalls and hauled them to barn, where they were packed and shipped immediately. I advocate the two bushel and three peck barrels and have never found any difficulty in selling them, provided the apples were of good quality. I sold my apples immediately after picking, so we packed them as fast as we could, shipping the last about December 1, and they were in fine condition. I have practiced all kinds of methods of handling apples, but think this manner of storing them the cheapest and gives the best results.

The marketing of our fruit is going to be more of a study than it has been, and I am confident that the entire profits of a crop may be wasted by not watching crop reports and markets. There is hardly any fruit you can handle the same as apples; for, their keeping qualities being superior to all (I refer to winter apples), we can hold them as desired. I except, however, the cider and windfall apples, as the quicker they are realized on the larger the profits. It has always been a wonder to me why California fruits sold for so much better prices than our own fruits, knowing that we had everything in our favor, viz.: a superior article, and quick access to market. They take pains in packing and making their fruit attractive, and I believe we should learn that lesson thoroughly ourselves before we ship any more fruit of any kind. We are the most favored, I believe, everything considered, of all our fruitgrowing states. Not only our climate and soil, but Michigan fruit has a reputation for flavor that is acknowledged to be superior to other states. "Beauty is only skin deep," admitting that Missouri has the preference for Ben Davis. Michigan Baldwins and Greenings are usually quoted among the first on the price list, and it is conceded that the flavor of our fruit has no equal.

We are shipping larger quantities of apples every year to England, and the demand for them is growing in other countries. If they can become accustomed to apples instead of the tropical fruits, they will give them the preference, as apples are more desirable and satisfactory. Our exports of apples last year were 849,804 barrels, valued at over two million dollars. The varieties most desired for exporting, according to our best reports on the subject, are Baldwins, Kings, Spys, Ribston pippins, and Russets. I am of the opinion that this part of our apple market should receive much of our attention and encouragement. I would suggest that

our State Horticultural society examine into the merits of this market thoroughly, and have references of responsible parties who do that business, both in this country and England. This would be a convenient and reliable source of information among our apple-growers, to obtain knowledge of the export trade. The foreign demand for certain of our products has raised the market value here quite materially, and would affect the apple market similarly.

As this paper's subject is of a comparative nature, I will have to form my opinion of its merits by giving a very cursory view of the subject. It is my opinion that an apple orchard well situated, and of best market varieties, will pay as much to the owner as any other fruit on the same land, if adapted to apples. Many of our smaller fruits are so susceptible to frosts that they are not very reliable, or rather not as reliable as the apple. It is very hard to give ideas on a subject of this character, that each individual hearer may justly qualify to suit his particular conditions of soil, altitude, market, and tastes. It is absolutely essential to success in any business, either rural or mercantile, that our best efforts and thoughts be actuated by a love for our occupation. It is a pleasant reflection, when we view the results of our efforts in planting and caring for an orchard, that we shall realize in fruits and profits. We often hear the appropriate quotation in connection with rural life, "He who makes two blades of grass to grow where only one grew before is a benefactor to mankind." How much more satisfactory, and justly so, is the view of a beautiful orchard laden with fruit. But there is an incentive gained and cultivated among those who follow the different branches of horticulture, which tends to elevate our standard of living by giving us higher thoughts and motives.

"To him who, in the love of nature,
Holds communion with her visible forms,
She speaks a various language."

DISCUSSION.

Mr. Judson: Does Mr. Sherwood practice thinning his apples?

Mr. Sherwood: I never have, and this is the first year I have felt they should be thinned. I have been thinking of it quite seriously, and I believe it should be done. There are some trees that look as though the apples had been thrown upon them with scoop-shovels and every apple had stuck. The foliage is not so rank as it should be. I think thinning practicable, though I have never done it.

Mr. Augustine: It seems to me that the question asked on the programme, depends on circumstances, whether apple-growing can be made as profitable as other fruits. When I was at the World's Fair, a Frenchman told me that in their country they did not know that apples could be grown anywhere else in the United States except Michigan and New York. So you may imagine I was surprised when I came here and learned that you were digging up your apple orchards and throwing the trees away and planting peaches. I have been puzzled since about it. When we started out and saw the beautiful trees, loaded, as my friend says,

as if the fruit had been thrown on with a scoop-shovel, I was puzzled to know why you dug up apple trees; but when I saw your four-year and three-year-old trees loaded with peaches, I could find the explanation. I was up in northwestern Iowa, and asked a man there about the different kinds of fruit, and he said, "We can grow blackberries here very successfully in northern Iowa." I went over his farm, and there were two men, one at each end of a long rail, pressing down the blackberry bushes and cutting away the soil, and two men on either side the row layering the blackberries. When I rode over your peach orchards this morning, I thought if I lived in Michigan I would put every foot of ground I had in peach-growing, and I looked at it in this way: You people can grow peaches here as they can not be grown anywhere else in the world, at least any part of the world I ever saw; and if you can grow apples as successfully and as easily as you can peaches, it seems to me the rest of us would better not attempt to grow any apples. I just want to leave this thought with you. You have something which I do not believe you really appreciate. Of course, the apple belt is larger than the peach belt; apples can be grown over a larger area; at the same time, it is only a small portion of this great country that can grow apples. South of Cairo, Ill., you can not grow apples, and up in the northern part of our state, we can not grow apples for commercial purposes. In fact, far north of central Illinois you can not, and peaches can only be grown in a very few places in this country. You have here something which is wonderfully valuable, and I am afraid you do not appreciate it.

Mr. Morrill: The most successful apple localities here are not quite so well adapted to peaches. As a rule, our most successful apple orchards are on land rather richer than that required for peaches, and it does not require the same rolling land, and we have room for all of them. The question is, which can be made the most profitable. We can grow them all successfully, where proper care is given. Mr. Sherwood has demonstrated that. The question of thinning fruit was spoken of. I hope next winter some member or members of the State society will be able to report fully and accurately on the value of thinning apples. We have an opportunity now; there is time enough yet, but it should be done before the seed formation takes place to any extent. There are one or two men who have agreed, having uniform rows of trees, to take at least a few checked trees and thin them down to what they think would be proper, and then to save them separate and measure them carefully and report on the value of the different grades that they obtain. I have two men who have agreed to do that, and I believe that Mr. Sherwood would be willing to do it. I mean to try it myself.

Mr. Sherwood: That is one thing that I have had on my mind for some weeks. Oftentimes our apples, though setting very full, will during the hot weather of July or August drop, and in this the apple is different from the peach, for it stays on until the first of October, and there are too many things that may come in that time, such as hot winds, blights, etc., in which the apples drop; and as a usual thing, where we have so large a crop, something of that kind does occur, but I think it is practicable. However, that is one of the reasons I have never followed the practice of thinning.

Mr. VanDeman: If they are thinned they will not drop so much. They drop because there are too many on.

Mr. Morrill: We will carry that a little further. Is not that the effect, oftentimes, of exhaustion, which would not take place if the fruit was thinned?

Mr. Wilde: The red apple is always popular in market, but the man who neither trims or thins raises evergreen apples—evergreen Baldwins, evergreen Ben Davis. Who wants them?

Mr. Killen: I must say, in regard to the quality of the fruit of Michigan, that in New York city your fruit of all kinds brings a higher price and is in greater demand than the fruit of any other place in the Union. I was in Liverpool market some time ago, and in the London market, and your apples there were in great demand. I have some friends over there, and they consider your apples and peaches something remarkable. Referring to your packing, I notice that you take more care in packing your fruit than they do in Europe. The best quality of your fruit, for the foreign market, is well packed, or they are repacked by the shipper in New York or Philadelphia. I was down south some time ago, in Mississippi, and a box of your fruit came in. It was sold in five minutes and there was no more to be had. I notice that the demand for Michigan fruit is great. You have not grown half enough, and they need more. As a nurseryman I notice these things, so I take the liberty of mentioning them. I hope you will continue to improve in your fruit, and send more of it to the places where the demand is great.

Mr. Sherwood: Why is it we are losing so many of our Kings in this county? In a few years we won't have any.

Mr. VanDeman: The King is a tree of weak constitution, and take this whole country over it may be said to be a failure as a tree, with the exception of the place of its origin, northern New York. I have seen it in almost every section, all over the apple country. It generally is weak or diseased, and I am not at all surprised to learn that the old trees are dying off. Young ones will do as well as the old ones, and no better. You need not be surprised to see them die.

THE FUTURE OF PEACH-GROWING IN MICHIGAN.

BY HON. F. J. RUSSELL OF HART.

My subject is one that calls for a stereoscopic view of the future of peach-growing in this state, as we shall see it and as it will be viewed by those that shall come after us.

As I understand the history of peach-growing, it has been the rule in nearly all sections of which we have information that peaches are more easily and surely grown in a newer country than in the same country as it becomes older and more widely developed and improved. The reason for that change may not be positively known, although two have been often pointed to as those most likely to be the controlling elements—one the fact that new and virgin soil may be more evenly balanced and a more perfect home for the peach tree, than the same apparent soil would be after its long cultivation and cropping, when the elements constituting a perfect soil may have been thrown out of balance by having been drawn upon with too frequent potatoes, corn, or other crops, without a replacing of the elements most extracted; or it may be from the fact that the would-be careful farmer or fruitgrower has used fertilizing elements which were out of place and were actually a damage to the producing of these particular fruit and tree elements. The second is the removal of the timber and the elements of protection incident to a wooded country. There may be many elements from this cause that would have an influence, some of which may be referred to, as in a new, wooded country the snows are deeper and more regular in winter, remain later in spring, the cold is not so severe in the winter months, the heat is not so intense in summer, a larger amount of moisture abounds and is likely to be more evenly divided during the year and in series of years. The winds are less severe and constant. We might refer to a third as one having more and more influence as a country recedes from its virgin state, that of diseases and the insect pests. These increase as certainly and regularly as cities grow and the lines of railways extend.

These are all elements that must be taken into consideration in making a forecast of the future of peach-growing in Michigan, and there are many other and important elements that will enter into the combination of circumstances which shall determine the question here to be considered, and one of those which may be considered as most prominent and far-reaching is the one of transportation. It need not be expected that the future of peach-growing in Michigan will be very much extended with the present facilities and cost of transportation. Those must be improved and the burden lightened to the grower, either by extending the territory to be covered, improving the facilities at a more moderate expense, or in some other manner. This is a matter that seems to be one of the elements in the future of the peach interests of Michigan.

It may not be out of place to consider this question from a sensible and reasonable standpoint, as it may refer to this interest, and see if we are able to determine what the probable result will be.

Michigan as a state has a world-wide reputation as a lumber state. It has justly that reputation. Many of the railways, harbors, and piers were built because of that interest, and all of the transportation companies in this state, on the great lakes, in Ohio, Indiana, Illinois, Wisconsin, and the other western states, have been affected, and have drawn a part of their life blood from the lumber interests in this great state. That interest is on the decline, and very soon it will be an industry of the past.

As a necessity, the railways and boats and transportation companies, not only in this state but in those I have named, will seek to retrieve the loss of the lumber-carrying interest by fostering and encouraging some interest that may seem to be able in part to take its place and be more permanent. It seems to me that they must naturally turn to the products of the soil. If that be done, the fruit interests of Michigan will play a very important part, and the future of peach-growing in Michigan is by far the greater part of that interest.

If I am correct, as I shall assume that I am, in the very near future more refrigerator cars will be used. They will be prepared specially for the Michigan peach trade, and the roads that will be soliciting for business will run these cars to the markets where the peaches are wanted, and at a cost that will be fair to the grower and the transporter. It need not be expected that this result will be fully accomplished at once. As the demand comes, the facilities will be provided. It is a matter of policy and compulsion with the carriers. The trade they must have. The quantity of business and competition will regulate the facilities and cost.

I shall assume that my reasoning is correct, and that transportation, in the future of peach-growing in Michigan, will be provided. With that question settled, we will pass to some of the other questions that may be deemed important. Michigan is a fruit state by nature. When it was made, the Creator had in mind that the lower peninsula of Michigan, and the western part of that peninsula, should be the great store-house from which should be drawn the peaches required to supply a large part of the people who should occupy this country in future generations. That territory is centrally located, in close proximity to large, growing cities, surrounded by a country that can not grow peaches and never will. The contingent territory is among the best in the world, capable of supplying a dense population of thrifty Americans.

Ultimately, on lake Michigan, will be located perhaps the center of the great manufacturing interests of this continent. The lake on the west will control the future of peach-growing in Michigan, so far as climatic influences are concerned, as it has in the past. It will spread a mantle of protection over the future peach-growers of Michigan, such as can not be vouchsafed to any other element on this continent.

In the future the prevailing winds will be from the west, as they have been in the past. The extreme cold will bound across the western prairie country as it has in all ages, carrying death and destruction to the peach interests in its path. Lake Michigan will rise in her majesty, as she has always risen before, and say, "Thus far shalt thou come and no further. I am the guardian and the savior of my Michigan peach-growing people." The lone flower on the yearling tree, as it shall nod to the May breezes, will continue to say, "To her I owe my existence." The monarch

of the peach orchard in the future, on a bright September morning, as the sun shall kiss the sparkling dew from its golden fruit, will continue to say, "To her I owe my fruitfulness and a long and prosperous life." This element will continue to exercise the same influence in the future that it has in the past.

In the early history of the state, either because of some of the reasons I have referred to, or because of those of which I know not, peaches could be grown in most sections. Then we find the commercial orchards about St. Joseph, Benton Harbor, Allegan county, Kent, Ottawa, Muskegon, Oceana, and Mason, and other counties, nearly all keeping an eye single to this great protector on the west; and the peach interest will continue to extend northerly until it reaches well up to the narrows of the lake, and until that is reached the interest will be successfully extended.

There are many other sections of the state where peaches will be profitably grown in the future, but the parties who contemplate the extensive growing of peaches in the future, outside of the influences of lake Michigan, may as well figure the risk incident to the business in which they are about to engage, and figure the cost of the uncertainty that will probably attend their efforts.

Those that seek to grow peaches in Michigan in the future, in undesirable locations, will as surely meet with loss and disappointment as the grower in the past has done, and for the same reasons; and to those localities loss will come because of climatic influences.

Misfortune may not come the first winter or the next, but we have a right to expect that nature will repeat herself. It has been true in all ages and will continue to be true in the future. The peach-growers of Michigan will continue to increase the acreage in these undesirable localities, both in the peachbelt and outside of it. If we have grown a crop of peaches in such a locality, with success, we are likely to continue to become more venturesome, until nature suddenly and certainly calls a halt, and we find years of care and attention swept from us in a day, as we repent by viewing our loss and misfortune.

It is well known, at this stage of the peach industry, which are the desirable localities for peach-growing. With a desirable location within the range of the influence of the lake, we have a right to expect that the danger of death to our trees in winter will be reduced to the minimum. Those localities that are unoccupied in Michigan today are legion. North of Muskegon river there are millions of acres of such waiting occupation. We have a right to expect that many of these localities will be occupied in the future and that the occupants will meet with success.

The soil of a large proportion of the peach-growing district is all that could be desired—dry, rolling, rich. The acreage of peaches in the future will be very largely extended. With that extension, undoubtedly, yellows will be extended and work northerly until no great area in the state can be said to be free from its ravages. Other diseases will undoubtedly develop and work injury to this interest. Insects will become more numerous and destructive, if allowed to run their course, but we have seen in the past, as the peach interest has developed and extended, that the growers have more and more made fruitgrowing a business, and they have been seeking information that, coupled with experience, will be

more largely disseminated in the future than in the past. The orchards will be better looked after. The fertility of the soil and its needs for the peach interest will be one of the leading thoughts of the future peach-grower. Danger from yellows and other diseases will be scented from afar, and eternal vigilance will be the watchword. Orchards will be better cared for, diseases more thoroughly looked after and stamped out, so that their destructive force ten years hence will probably not be so great as at the present time. A better quality of peach will be grown because of these facts, and grown along more scientific lines. I must say that the future of peach-growing in Michigan has a bright prospect.

Within the next twenty years the peaches grown in Michigan will in amount be four times that grown at the present time, and they will be much more valuable as a whole, from the fact of better transportation, and from the further fact that peach-growers are learning that the novice can grow all the poor peaches the market requires.

I believe in the near future there will not only be a great stride in the growing of peaches, but in putting them up and in their sale. I expect within ten years to see nearly all the peaches grown in Michigan sold by the grower as other farm products are sold, at his home town. They will be either turned over to companies for packing, and put up in regular brands, recognized by the market, or sold by the grower direct to the dealer, to be packed or graded, so that quality shall be more prominent than at present.

I think I can safely say that the future of peach-growing in Michigan will be that we shall continue to grow peaches; that the quantity will be very much increased; that the quality will be improved; that transportation and distribution will be largely extended at a very much less expense, in proportion, than at present; that peach-growing will be reduced much nearer to a business basis than at present, and that peach-growing in Michigan, in the future, to a live business man, who will look closely after it, will prove to be a pleasant, permanent, and profitable calling.

DISCUSSION.

Mr. Sherwood: Which is there the most money in, early or late peaches?

Mr. Slayton: Neither; half way between.

Mr. Morrill: In my own work, I have found an early freestone the most profitable; but the early peach, speaking of very early peaches, is not very profitable in this country. At the same time, how well they pay depends on the crop south of us.

Mr. Morrill: Are there any new kinds of peach deserving special mention? I would like to hear what Prof. VanDemian knows regarding this matter of the newer peaches.

Prof. VanDemian: I don't know of anything that is at present attracting more attention than Triumph.

Mr. Morrill: A good many people would like to know if you have seen it, and what you think of it; what are the qualities of the tree and peach, size and marketing qualities?

Prof. VanDeman: It is a yellow peach, of fair size, quite good quality, and distinctly freestone, and it ripens about with Alexander and Amsden. Compared with them, it is about the same size. I have not seen it in quantities, here and there only, a few specimens from different sections of the country. I have not seen the trees in fruit. I do not know the orchard behavior of the tree from actual observation. I have only hearsay information. I have talked with the North Carolina men who are growing it, and my neighbor, Mr. Charles Wright, in the Chesapeake peninsula, says that it is a very good orchard tree so far as he can see. He has not tested it with a big crop until this year, when it appears as if there would be a very good crop. I do not know of any peach I think more of than that, as an early peach. There is another peach I have found in Kansas. It is a late peach of about the quality and size and color of Oldmixon, but it ripens about with Heath Cling, and I hardly know of a peach of better quality. It is a bright red with a greenish-white grain, and for late marketing it is certainly a fine thing. It is a peach very few people know about, and I would not advise planting an orchard of it—might plant a row, but still it is one of the things you should look after.

Mr. Morrill: Have you seen the Carman?

A. My only information regarding that is from Texas. I believe it came from Texas. I have only hearsay evidence. I want to say further that this Triumph peach is of the same general character as Elberta. So is Carman, and the coming peaches, of the south especially, are of that class.

PEAR CULTURE IN BERRIEN COUNTY.

BY MR. GEO. F. COMINGS.

It is related of Sir Isaac Newton that toward the close of his life he spoke of himself as being like a little child, picking up pebbles along the shore of the great ocean. The great unknown which he had failed to learn lay before him.

I think, after twenty-five years of fruit culture in Berrien county, what I don't know about fruitgrowing is more than what I do know. It would be easier to speak of what I don't know than of what I do. Many things which I thought I knew a few years ago, I conclude I do not know, after all. Perhaps things I think I know now I shall find I was mistaken in hereafter. In regard to the possibilities of pear-growing in Berrien county, I would say that though the county is not large, yet I think its possibilities are great.

The gentlemen who took the drive through the country this morning saw a great many acres which are still in a poor state of culture. Some are devoted to farm crops, acres just as good for peach or pear or grape culture as many which we saw devoted to that purpose. I believe much of this land will some day be devoted to fruit-raising. When I said the possibilities were great, I did not mean the possibility of making money rapidly and easily.

I think often, at these meetings we feel that great obstacles are coming up before us which require a great deal of investigation, and I imagine, as the years go by we shall find it all the while a little more difficult to make a success, if we measure success by dollars and cents.

In regard to the prices of fruits, it has been suggested here that there is always an opportunity to dispose of fine fruit. Now, the packing of California fruit is as good today as it was years ago. It is put up the same all the way through and is as attractive as ever; and yet of late California fruit has been a drug on the market, notwithstanding its beautiful appearance. The fact is that that kind of fruit sometimes becomes a drug. I don't believe we need to paint any rosy clouds for fruitgrowers in Berrien county, and yet I believe the possibilities are unmeasured. Go into any township you choose, you will find hundreds of acres as well adapted to pear culture as other hundreds already devoted in that way. The possibilities are great, and there are great opportunities for the young people of our county to set out pear orchards; and with diligence, industry, and application of brain and muscle, I see no reason why pear culture should not be a success in the future, as successful as any other line of fruitgrowing.

A word or two, now, in regard to soil and location. I used to think that the ideal pear soil was a heavy clay. I have changed my opinion on that point. Perhaps I am wrong now. In my opinion now, the ideal soil is a sandy loam, a lighter soil. I believe with this soil we get better pears and better results; and yet there are many good orchards on the hard soil. I think the mellow soil is particularly desirable for dwarf trees. The standard pear will do much better than the dwarf on the hard soil. Sometimes a heavy rain wets the soil and a heavy wind comes. The trees are not well rooted there, and they are swept back and forth, and they are not a success on the hard soil.

In regard to preparation of the soil, I would say, if you have a clay soil, I would plow and subsoil, work up the ground deeply. With the lighter soil, it will not require so much preparation in that line. In all cases I would avoid ground which has a good deal of water in the subsoil. The standard pear roots deeply, and if the soil is inclined to be wet you should underdrain. A cold, damp subsoil is bad.

The distance for planting, not less than 20 feet—perhaps 22 or 24 feet.

In regard to pruning, I would say that there is a great difference in the different varieties in regard to that. The Kieffer, Howell, and others of that kind need exercise of great care and good judgment in pruning, if you wish the ideally shaped tree. With all varieties the first few years are the essential ones if you desire to get fine trees. In pruning a pear tree, the Kieffer tree for instance, be careful not to allow any very long limbs to form, and after you have once commenced pruning, follow it up several years by cutting back a third or a half of the preceding year's growth, and follow around the tree, leaving one central shoot. The next year go over your trees some time in March or April, again, with your jack-knife. Do your pruning with your knife. I have followed that process of pruning three years now, and I think the Kieffers are very handsome trees indeed. They have a wider and finer top than you will have unless you follow some such plan of pruning. I have suggested that

most of the pruning should be done with the jack-knife, and that I think is good advice. Follow it up each year, and cut while the limbs are small. You will cut more than you think you should, perhaps, but the growth changes the relative distances.

The question of crops between trees has been discussed, and I will only say I think the question hinges on the fertility of the soil and the amount of feeding you are willing to give the soil, and the kind of crop you plant between the rows. I have followed the plan of setting a crop of corn the first year. Often in July and August we have long, dry times, and the shade of the corn, when the trees are young, I think is a benefit. They were grown the year before in nursery rows, where they were shaded more or less, and I think sometimes the shade of the corn prevents injury from heat.

In regard to how often we can expect a crop, I used to say that with these conditions, and proper fertility of the soil and thorough thinning, we might calculate on a crop of these fruits regularly. We have, however, had cold storms one or two springs at blossoming time, which prevented the setting of the fruit. I would add, as one of the conditions to secure a good crop regularly, spraying. I think that with the Bartlett pear and some other varieties, if you will keep the land fertile, so it would produce forty or fifty bushels of corn to the acre, you can depend upon a pretty regular crop of pears. The tendency is to bear full one year and lightly the next, but if you will take up the matter of thinning and thin so the pears will not be closer than six to nine inches on the limbs, you will get about as many bushels or barrels one year as another.

In regard to planting pear trees, I would urge upon you to plant a number of the different varieties, commencing with the early, then those a little later, and so on, until you have a long season of this delightful fruit. I think it adds to the pleasantness of home, and is a source of enjoyment to all in the family. The pear is a delicious fruit, and by the judicious planting of different varieties the season can be much prolonged. There is no reason why, in this country, every farmer could not have a little portion of his farm devoted to an orchard of this kind.

I think good culture in pear-growing is as essential as with any other kind of fruit. The better the culture the better the results obtained, and I would suggest also that it should be given early in the season. Late growth I would avoid by all means. Do your cultivating and forcing early in the season, and then, perhaps in the middle of the summer, give up the culture and let the fall and the rest of the season be taken in ripening the wood growth, so when cold weather comes the growth will be well seasoned.

I don't know that it is necessary for me to emphasize the point of spraying, because it has been brought up by every person who has spoken. It is one of the necessary conditions to success now, in growing a large part of our fruits, and will apply equally well to the pear as to the other varieties spoken of.

I don't know that I could give any figures as to the profitableness of pears. I have no desire to, but a good crop of pears will yield a large return per acre. An average price for pears is \$1 per bushel, after paying the necessary expense. If you have 110 trees to the acre, 20 feet apart,

and each produced five bushels, you would have over 500 bushels to the acre, and these at \$1 per bushel, would be \$500 per acre, and I think such crops have been harvested here. As I have before indicated, there are mishaps and mistakes, so that your ten acres of pear orchard does not return \$500 nor \$200 per acre, every year; but with proper culture, diligence, and intelligence, I see no reason why the culture of pears should not be successful in Berrien county, and why our county should not be noted for its pear as well as its peach orchards and its vineyards.

One or two of the most productive orchards I have known have been orchards where the varieties were mixed, so providing perfect pollination. I would suggest that persons planting pear trees would do well to plant a few rows of a kind supposed to be sterile, then some that blossom at the same time but of another variety. The principle is, that if you have at the time of bloom warm weather, so that the bees are at work industriously, they will carry the pollen from one tree to another, quite a distance, but sometimes the pear trees blossom when it is quite cold. In such instances, the bringing nearer together of varieties that will fertilize one another will be of benefit. In many instances, in a block of 500 trees, the time and circumstances of blooming would be such that they would be fertilized; but another spring might be unfavorable, and then, if you have the other kinds in proximity, it might be of great benefit. So I would suggest mixing varieties.

SOME POINTS IN PLUM CULTURE.

BY MR. J. N. STEARNS OF KALAMAZOO.

I much dislike to attempt to say anything before such a meeting as this, upon a subject about which there are many who are much more capable than I to give the desired information.

In the matter of plum-growing, the past ten years, the question has been, mainly, how can we grow them and what sorts are most sure to bear. These two questions have been so often answered by the success of nearly every one who has plum orchards, that I think at this time the more pertinent question is, what shall we plant that will pay? Here I may drop a word of caution to the plum-planter, not to plant too many of the Japan plums, as all I have seen come too early for profit—that is if you have many. There has been a large amount of plums planted in the state in the last two or three years.

It is being more fully demonstrated to me, in the last five or six years, that the later plums pay best. People who put them up for winter use, are not ready for them, and the demand is light until this class call for them.

I believe the time has come when it is important, in selecting sorts to plant, that quality and appearance should demand more attention than the selecting of very prolific bearers. I do not mean by this that you shall select such sorts as Washington has proved to be with me. Planted some fourteen years, with bodies ten inches through, they have never

borne enough to pay for first cost of trees. But there are other attractive sorts, coming late, that will produce enough. Among those that I have tried, are Bavay, Coe's Golden Drop, Quackenbos, Pond, French Damson, and many other sorts I have not fruited.

I have now what I may call the fifth full crop of plums in succession.

The plum is very likely to overbear, and in so doing only produces a crop in alternate years. I will give my mode of treatment, to which I attribute in a large measure my having a good crop every year.

I do considerable pruning and shortening in, sometimes cutting off ends of branches back to where they are an inch in diameter.

This is partly to avoid thinning, which I do not practice, as it is too expensive to pay. I believe it would pay to thin them by hand if one could do it without having to hire help; but to thin by paid help, it will not pay, as I have tried it pretty thoroughly.

It is all we can stand to thin the peaches, which we must do, and we find that quite expensive, as I have had four men at it two weeks and they can not see through yet.

Then, as the plum is a heavy producer, I feed heavily with manure and ashes, annually, and give the best of cultivation, as we must keep up the growth in order to get fruit buds for the next season's crop; and for the past four dry seasons have still further helped the trees with their load, by irrigation, which I do by hoeing the soil back from tree four to five feet all around. This forms a dam to hold the water. In this I put about a barrel of water, and when the water has soaked in about the roots the dry soil is pulled back, forming a mulch to hold the moisture from escaping. If it continues as dry as it has been the past two seasons, I repeat this in about two weeks. I have found this treatment to make a marked difference between the appearance of the trees so treated and those not irrigated, both of plum and pear.

I watch closely for black knot, and cut it out in its first stage, when it looks like a brown wart, and by this means I have never lost a tree nor an important branch by this disease, and I have found a little of it for twelve years.

I spray my trees with Bordeaux mixture thoroughly, before blossoming, and endeavor to do this as soon as the buds begin to swell. It is just as well, I think, to do this spraying still earlier, and I am not sure that it would not be just as effectual to do it in the fall after the foliage had fallen. But whenever it is done it should be very thorough, the solution reaching every branch, and the body as well.

I believe this spraying will have much to do with preventing black knot, and I know it will prevent leaf blight and rot.

I spray again, just as the swell is coming off the plum, with the same mixture, to which I add a quarter of a pound of Paris green to fifty gallons of the mixture. This I follow up two or three times, as the plum grows, aiming to keep the surface of the fruit covered with the solution. I know many will say this is useless against cerculio; but, as the boy told Prof. Gulley, last winter, I know I get the plums all right, and that is the essential thing.

QUESTIONS.

Do experiment stations earn the money it costs to support them?

Mr. Graham: It occurs to me that we would be very greatly at a loss in the state of Michigan, without the experiment stations. I know there is scarcely a week that goes by, but that there is some question in regard to horticultural topics, as to which we are at a loss what to do; and the questions are always sent to the experiment station, or the college, and usually a satisfactory answer comes back. If we are in difficulty, there is some way pointed out to us, and I should say that the stations earn their money many times over.

Mr. Alexander Hamilton: I would say about what Mr. Graham said, if I undertook to say anything. I have no way of telling, however. Information has come to us some way, but we never took any particular pains to learn where it came from; if it came from experiment stations, we should surely say that they have earned their money, and I presume that is the source of a great deal of it. I have usually asked the first man I came to, that I thought knew, anything I wanted to find out, and I never asked him how he came by the knowledge, and I myself have never taken the trouble to go or write to the experiment station. I have usually found that Mr. Morrill or Mr. Hawley, or somebody else that I could apply to, would give me information. Where they obtained their information, I have never asked.

Mr. Morrill: Possibly from the experiment station.

Mr. A. J. Kinsley: I have been in the habit of receiving bulletins from different stations. I get the Geneva bulletins regularly, and also those of Michigan and Washington, and in my little experience on a fruit farm, if I should obliterate all I have learned from the bulletins, I think I would be a sorry-looking farmer and my farm would be sorry-looking too. I do not think any of our practices, such as spraying, budding, and fighting our insect enemies, are such as we would have had but for the bulletins. I can hardly think of anything but I have seen in some bulletin or some horticultural publication. I suppose that one object of the experiment stations is to be always on the lookout, and to gather in ideas, wheresoever they spring from, and test them, and, if found valuable, to put them into a bulletin, and send them out among the farmers. I certainly think that the experiment stations are very valuable to the fruitgrowers and general farmers. Of the Geneva reports which I get, of course many are of no value to me, those relating to stock matters, etc., but they certainly are very valuable to the general New York farmer. I should vote that, whatever they cost, it is money well spent.

Mr. Merry: It looks to me as if we were each a little experiment station in himself, and that if the tax is not too high we ought to "chip in" a little. The theory is all right.

Prof. Taft: Regarding expenses, no one in the state pays a cent of tax for the station. The college receives for this work, from the national government, each year, \$15,000, which come from the sale of public lands in this or other states. It comes directly from the sale of lands, and does not require any tax. The expense of the college is borne

in practically the same way, except that each year, or for the last two years, there is an appropriation of varying amount made, to defray the expenses of repairing and erecting buildings. The original law provides that the college can not use any of the money, either the principal or interest, for the erection or repair of buildings, so that this year there were ten thousand dollars given for this purpose. As I recollect it, the cost to tax-payers is something like two cents on, I think, every thousand dollars' worth of property they pay taxes on.

The President: I am glad that Mr. Merry touched upon this point, because many people of the state of Michigan supposed that the state was supporting these things by direct taxation; it is an excellent thing to be brought out.

Mr. Comings: It is hard to measure in dollars and cents the benefits from some of these educational agencies which we have. The question might come up whether the minister earns his salary. He doesn't earn it in the same way a man who paints a fence or builds a house; but if the experiment stations or the ministers or the newspapers are helping to make better and more intelligent citizens, and better and more successful farmers, then I would say the money is earned. I think we are too much in the habit of estimating the success or failure of any undertaking by measuring it by the standard of dollars and cents. There are other standards that are better and higher. We measure everything—sermons, newspapers, and the lawyer's plea, by the almighty dollar; and I believe, so far as I am able to judge of the work of the experiment stations, they are doing a good work, and are training the farmers to become interested in experimenting themselves, and teaching them how to try these experiments carefully and accurately. Farmers are prone to jump at conclusions. They fertilize a certain way this year, and next year they do the same thing, or apply it differently and get different results, and there may be a dozen different causes producing the different results. I think we work very carelessly and unintelligently, and the reading of bulletins and the awakening of interest among farmers and their boys and girls, in improved methods, is one of the educational agencies fostered by the college and station, for the betterment of our condition. I do not think it is possible to answer that question intelligently, because we do not know the exact cost, nor the proportion of the crops saved or increased; but, looking at it in a broader and higher sense, I believe they are more than earning the money spent. I hope the time is coming when we shall judge all things by a higher standard than one hundred cents to the dollar.

Prof. Slayton: I think that every farm, and especially every fruit farm, should be an experiment station. I believe that we do not experiment enough in the line spoken of. We read of what is called a good thing, and in nine cases out of ten we practice the whole of it. For instance, we use some super-phosphate. We plant a field of corn, and we use the phosphate on the whole. If we have a good crop, it was all the phosphate. We do not take into account at all what the season was, or anything of that kind. If we have a poor crop, the phosphate was of no good. In trying any new thing, I think, we should omit certain parts. For instance, in planting corn, I should plant alternate strips, with and without the phosphate. I would cultivate differently, different parts of

the field, and then I would know, at the end of the year, something about that to which I could attribute the good or poor crop. In spraying trees, for instance—we read it is a good thing, and the law says we must spray, and we spray the whole orchard. Up in the northern country we haven't had many apples. Was it the spraying that killed the apples? Down south they had a pretty good crop, I think. Did the spraying make the good crop? I think we should experiment some. Every fruit-man should be an experimenter. A few rows should be left unsprayed. Then, if he has just as good crops on the corner that is not sprayed as on the other, he can not attribute it to the spraying alone. We do not experiment enough, either on the orchard or farm. We serve the whole field or orchard alike. We want to know whether the good crop is to be attributed to the mode of cultivation, or the season, or the previous treatment of the ground, or heavy manuring. We should look for more than one cause for every good or poor crop. As to the stations, they are costing the state not one cent, and I think we are reaping, so far as I know, a wide benefit. One single bulletin may be worth more to the state than the whole \$15,000 which the general government is good enough to contribute.

Mr. Edward Hawley: I think we are all agreed on the value of the experiment stations. So far as I am concerned, I have received considerable instruction in reading bulletins issued by the various stations. I think they are a valuable feature.

Mr. Comings: I think that Prof. Taft rather carried the idea that we are receiving gratuitously that amount. I think the people somewhere, sometime, or somehow, pay for this.

Prof. Taft: I said there was no direct tax. It is from the sale of the lands. I think we should measure the benefits of the station fully as much by the results attained by those who make use of them. To be useful, the advice and recommendations must be followed, and the farmers must avail themselves of them. We can issue a bulletin every day in the year, and can reply to letters, a hundred a day perhaps; but unless use is made of the advice, in some sense, it will not do any good. We are doing all we can to encourage this work of experimenting by the farmers. This year we have formulated various plans for the use of fertilizers on certain crops, the testing of varieties and the new kinds. We have furnished seed, sending out something like 500 packages, for test, seed that was grown by the college at comparatively small cost (merely that of growing, often, and yet seed which could not be bought for less than fifty cents or a dollar per pound from the dealers). We sent out 500 packages this year, besides at least 100 varieties of trees. In some cases twenty-five or fifty of a variety were placed in the hands of fruitgrowers, choosing one in each county for trial, and we hope to have results from these that we can publish; and we hope that the neighbors of these men can obtain advice, and in some cases we hope to have the products exhibited at the county institutes. Regarding the station paying in dollars and cents, of course it is divided up pretty well among the farmers; but during last winter we received a visit from a gentleman of the state who said that the knowledge he had gained from the bulletins was worth to him, last year, \$1,000. He said that his orchard was badly infested by a scale insect a few years ago, and he wrote to the college.

His trees were in a fair way to be destroyed (those of his neighbors were destroyed), but the advice received from the college enabled him to save his orchard, and last year alone the product of that was \$1,000, whereas his neighbors' trees had been entirely destroyed, and he was the only one who sold apples in that section.

Mr. Morrill: It seems to me that it is beyond question, and there seems to be only one view of it here tonight, that the experiment station is of much more value than it costs; but, of course, it can not be of any value to the man who does not avail himself of it. The conditions demand a higher education among farmers and fruitgrowers, to make them successful. I do not mean a literary education, but a technical education, and the experiment station is a helper. Experiments, as a rule, can only be made (or, at least, the results be observed) once per year, and one year does not furnish sufficient evidence upon which to base a conclusion, because conditions may alter the results of a year's work. The experiment stations take care of all these matters and furnish reports of the results of their work, gratis, to all who will receive them. Those who do not need it, who do not care for it, will of course receive no benefit. Those who do, will get a great deal of help. I was one of the poor unfortunates who started in the business and did not know anything about it. Many people know all about it. They do not have to listen to bulletins. I am sure, however, that there is little doubt about the value of the experiment stations, though it is only a few years since opinion was much divided as to whether they were of value at all. At the same time, when we look back, we see that many of these things which we call modern practices, as, for instance, the practice of spraying, were developed in the experiment station of Michigan; and if its advice had been carefully followed there would have been few mistakes. There have been some, but they have come through ignorance or carelessness; but the careful man, who has taken his lessons from the careful experiments of the station, has usually come out all right.

Mr. Thomas Wilde: I was a little dissatisfied with the progress of our Michigan experiment station, so I sent to Washington and other places, for their bulletins. I got them all together and studied them carefully, and I found that the Michigan station was far ahead. It had made more progress than any of them. When Prof. Bailey was here he told me that arsenic would not kill curelio. I suggested that he go home and try it. He afterward acknowledged that they died. He killed some with arsenic. Our experiment station told us, I think it was Prof. Beal, that crimson clover was not a success. I can not see that there is anything the matter with it, when it is sowed at the right time. I asked Prof. Taft about it the other day, and he said it died in April, usually. Now, I had an excellent crop. So, sometimes, the experiment station will make experiments and not succeed, and yet, in some other part of the state, the same thing will be a success. They set us to thinking, though, and I think we farmers all ought to help them.

What fruits, if any, are being planted in excess?

Mr. Graham: I believe that all fruits are being planted in excess, without any exception, unless perhaps it is apples. There are thousands of trees being planted in locations where they will never give satisfactory

results. They will produce when every grower has a crop, but when there is a shortage these locations will have none at all. They are a detriment to the country at large, and a source of annoyance and a loss to their owners. There has never been too much said in horticultural meetings and writings, on the indiscriminate planting of fruits. Some speakers have discouraged planting in all locations. Perhaps this does not apply to this part of the state, but in my part of Michigan, and all through the interior region, there is only an occasional place where fruit will be uniformly successful. In that sense, I believe all fruits are being planted in excess.

Mr. Morrill. I think nine tenths of all well-informed men will agree that this is a fact.

Mr. Hamilton: People in the nursery business do not think so. I think it is to their interest, also, to find out what is being grown in excess. Such things as are grown in excess are not paying the nurserymen to raise, and there is little use for them to grow them. The gooseberry, at the present time is being grown to excess, and nurserymen, I fear, are going to find but slow sale for the plants, and it may be that they are producing other plants and trees largely, which are grown to excess; and if so, they would be very glad to be warned in time.

Mr. Morrill: The nurseryman's work must be laid out two or three years in advance, and he must know, in order to make a success, what will be wanted. I think this subject should be considered carefully, for all are interested in that question.

Can curculio be controlled by spraying, especially on peaches, and what is the time to apply?

Prof. Taft: Replying to that, my own experience is that we can control curculio by spraying, and we can rely on spraying, provided we can spare a few of the peaches or plums. I mean that, in order to be effectual, the tree must be sprayed before the peaches have been injured. The insect, of course, in order to be affected, must eat some of the poison, and it will take twenty-four hours or more before the insect is destroyed. In that time the insect is able to deposit its eggs and, provided the fruits are not numerous, the injury would be so great that we would be justified in jarring or using any other method of destroying them. But provided the fruits are numerous, I believe we can save in that case three fourths to perhaps nine tenth of the crop by spraying. If they are very scattered, the curculio will take most of them before the poison takes effect. My practice in this matter is, if the fruits are not numerous, to jar, and save what I can. As, this year, the fruit is plentiful it would be a good thing, perhaps, to have part taken off by the curculio, and by careful spraying we can save all we want of the crop. I spray with Paris green and lime, and for the first application I have also used copper sulphate, mixing Bordeaux mixture and Paris green. I would not think of using Paris green without the lime or Bordeaux mixture, and, aside from the effect of Paris green on the curculio, I would consider that I would be well repaid by the increase of leaf growth, and the check to the fungus in case of the peach and plum, and the rot; and the use of copper sulphate at this time will do very much to increase the strength and vigor of the tree and make healthier foliage. My impression is that in this alone, the improvement

of the foliage and the new leaf growth possible, there will be ample gain to repay the expense of at least one spraying.

Would it do to use arsenic instead of Paris green?

Prof. Taft: I do not like to recommend arsenic in talking about the peach, though I have used it myself instead of Paris green. Arsenic is more likely to injure foliage unless properly used; but, where properly used, it is more likely to be pure, and the expense is not a quarter, last year it was less than one sixth, the cost of Paris green. If I used arsenic I would take, for instance, a pound of arsenic and two pounds lime, and, after slaking the lime, would boil them together for at least half an hour. In that way we form an insoluble material that will not burn the foliage, but I certainly would advise any one to try it on a small branch before using it. We find, however, that after boiling it for half an hour we dissolve the arsenic, and it becomes insoluble and does not injure the foliage.

Mr. Thomas Wilde: Don't you think you can kill the larvæ of the curculio, after deposited, by spraying?

Prof. Taft: I think so, in case the gum has not covered it over and closed the opening. If the poison gets into that place, as it will, if you spray properly, you are pretty likely to destroy it. But, in all cases, you need to apply it very freely, and cover that part of the fruit, so if there is a small opening the poison will go inside. I have noticed that where we spray we greatly increase the number of instances where there are scars on the fruit which do not have worms inside. We have left some unsprayed, and while in some cases, of course, where the worm does enter the egg fails to hatch, or something happens; but we find far more cases where there has been an egg deposited and no worm found, where we sprayed, than where we did not spray, so I am convinced that, if we spray and the gum has not covered the egg, it is effectual.

Mr. Wilde: I have used arsenic a long time, perhaps fifteen years, but it is a long time since I have used Paris green. I have had good success with arsenic. I first used it diluted (dissolved it) but after a while I began to put a pound and a half into a pail and put in some lime, and stir and boil it, and I have found bad effects but once. I got some very hard crystals, and it burned the leaves somewhat, but the arsenic I have now dissolves completely in the heat of the lime; I then measure out what I want, and pour it into my barrel, or into the Bordeaux mixture, and I have used that on plums, and killed the curculio to a considerable extent. One application will do, on Lombard. There is one peculiarity about it, though—if it washes off or doesn't stick, the curculio will be present on the tree afterward. Then you can jar it. The only case I ever knew of spray burning was where I used corrosive sublimate, and I had some fine lime that coated the leaves, and I never saw a live curculio on the tree; and there were no live trees, either. I found it a very powerful poison. Of course it is more expensive and dangerous. A calf once took a suck of it, and it was very damaging to the calf. I have used it on potato bugs, and have applied with lime and arsenic, without anything else, and it worked all right. My son uses Paris green; he sprayed so many times that the weight of the fruit broke the trees down. One man found fault with me because I recommended spraying and didn't say

anything about thinning the fruit. He said I spoiled several orchards by telling them what to spray with, and neglected the caution about thinning. It certainly does affect them, and you can control curculio to quite an extent by spraying.

Prof. Taft: I think I can sympathize with Mr. Wilde in that respect. There was a gentleman in Oakland county who had been looking up the matter of spraying, and has for several years obtained good prices, from the fact that his neighbors had not "caught on" and didn't spray. He says they have now learned about it from the college bulletins and the market is flooded, and he can not get anything for his plums. There is a necessity of using lime with arsenic, for a double reason. In the first place, arsenic is insoluble in water; water will only dissolve a small amount of arsenic for an orchard of any size, even using boiling water; the lime has a peculiar action from the fact that water is able to dissolve only a small amount of arsenic; the lime unites with this and forms the arsenite of lime; this drops to the bottom of the kettle and the water is again clear. A small amount of arsenic is dissolved and again taken up by the lime, and so it goes on. Without the lime, it would not be possible to dissolve a one hundredth as much in a given amount of water. If we should attempt to use arsenic without lime, the chances are we would burn the foliage, for the arsenic acts as a strong acid, and would do harm at the ordinary strength; but, being insoluble, it falls on the leaves and remains there. The insect feeding on this will be poisoned nearly as soon as in eating clear arsenic. It is perfectly safe to use it in this way provided we keep it away from stock and human beings, and I would prefer it, if it is properly used, both on account of its being more likely to be pure, as well as being cheaper.

Is it possible to thin grapes at this time, early in June?

Mr. Van Brunt: I never do it, nor trim in the summer time. I generally do the thinning in the spring when I trim them.

Mr. Morrill: I suppose, Mr. Stevens, you have reference to a crop, which from lack of being trimmed down is too heavy at this time.

Mr. Stevens: There is one twig with five bunches on.

Mr. Merry: I never had any experience in that direction. I do not do any thinning at this time of year. I intend to do it in spring, but I should think thinning would be a very good practice if the vines were overloaded.

Prof. Wheeler: In growing grapes in the college grapehouse, for profit, the clusters are cut off but one, and each one of these clusters is thinned out. There is enough left then.

Is there any new blackberry which promises better than the old sorts?

Prof. Slayton: Is there any old sort which promises well?

Mr. Morrill: New sorts, in the catalogues, generally promise everything.

Mr. Stephen Cook: I have tried some of the new varieties, and I threw them away. I can not find anything better than the old ones, but perhaps there is. I am trying Eldorado, Minnewaski, and several others, and whether they will amount to anything is a question. There is one old

variety which, but for one thing, would take the lead—the old Kittatinny, if it did not rust.

Prof. Taft: The Eldorado is promising. Last year our crop was destroyed by spring frosts, and this year the crop is not ripe, but the plants are fully as hardy as Snyder; and with us last winter was quite severe on all the raspberries and blackberries.

Are ants in a peach and apple orchard, a pest? If so, what is the remedy?

Mr. Cook: In my observation, they do not have anything to do with injury.

Mr. Smith: They appear to feed on the foliage, especially the tender growth; and they appear to burrow near the root, about the collar of the tree, and run over the whole top. Are they pest or anti-pest?

Prof. Taft: I think there is generally something in the trees for which they are looking. Whenever you see an ant running up a tree, there is something wrong with the tree.

Mr. Morrill: Have you ever noticed the leaves curling and dropping?

Mr. Smith: I have noticed that some in the peach.

Q. On the cherry?

A. I haven't noticed it there. In the apple, the tips and tender growth of the sprouts are eaten, when there are no canker worms about, but there are ants, and it seems that they do it.

Mr. Morrill: Look on the under side and see if the ants are not associated with little green lice.

What about the new varieties of currant?

Prof. Taft: I think North Star is a promising variety, and it is far less injured by borers than Fay and others, and has the same strong growth. I think North Star is a particularly promising new variety. We have had it four years. Last year frost caught us again, but this year they are bearing very full. The plants are strong and seem free from the borer, or comparatively so.

Q. Do they grow as large as Victoria?

Mr. Morrill: They are rather larger than my Victorias, and even stronger growers.

Are currants and gooseberries a paying crop?

Mr. Boynton: Not in 1896. I speak particularly of the gooseberry, and I think that in 1896 they will not pay. I do not know the reason, except that the crop is very prolific, and there seems to be more of an over-production in that than in wheat and a good many other commodities.

Mr. Reid: Without knowing exactly what may be the trouble, I surmise that the too early picking of the gooseberry has much to do with it; for, on visiting Chicago recently, I saw thousands of cases of gooseberries that were withered from too early picking. They were not much more than half size, or half the size that mine are, either Smiths or Downings, and I would not think of picking either of these until the first of next week. Any person purchasing a crate of this sour and immature fruit would not want any more, and perhaps that influences the market as much as anything else, especially as the quotations say that good ones are

in demand. I believe it is the too early picking, a fault which ruins much of our marketing of fruits, especially grapes. I believe there is a good demand for gooseberries in proper condition.

Mr. Smith: Do gooseberries and currants become more tart as they ripen? They are said to require more sugar.

Mr. Reid: I can't say as to that. I have eaten green currant pie which appeared to be mostly sugar. But there is a great loss of flavor by premature picking of gooseberries. But someone is in a hurry to get the early market price, and rushes them in, and then everyone follows. I know one grower in Allegan county who marketed his whole crop of Early Crawfords one year, before they were ripe; and while he made money that year, he was unable to sell at all to the same men the next year. It is a fact that very much of our fruit is sent into market before it is fit to go.

Mr. Morrill: Taking that one crop, it is a noted fact that for three years the gooseberry-growers of Michigan have been picking a little sooner and a little sooner, because they could get a little money out of them, and because it is a fruit picked in its green state anyway. I am satisfied that it makes a vast difference.

Mr. Reid: One of the fruit journals, this summer, advised picking them when they were half grown, saying that the flavor was much better. As to the currants, the case is a little different. They are not used simply for dessert, but also for jelly, and for that purpose they are much better before they are fully matured. Of course, they never market absolutely green fruit. So premature marketing is not so likely to occur with this as with the gooseberry. Those who eat the gooseberry after it is fully ripe find it a wholesome and palatable fruit, and I believe the liking and fashion for ripe gooseberries will grow in this country, especially for the larger kinds.

Mr. Morrill: No one has answered the question as to the profitableness of currants and gooseberries. Do they pay, even under present circumstances?

Mr. Smith: One year's test would hardly be sufficient.

Mr. F. E. Rood: I think, generally speaking, they have done very well. Still, they have been great bearers.

Mr. Edward Hawley: We have found both gooseberries and currants profitable heretofore. This year, however, we are afraid prices are going to go back on us.

Mr. Morrill: What do you think will be the cause—too much fruit, or premature picking?

A. We don't know whether currants are going to follow gooseberries in the drop this year. Certainly gooseberries are selling very low.

Mr. Morrill: Do you think that Downings are ready to pick yet?

A. Yes, just about now. The early market a year ago was the best, and this year they have gone to the extreme of shipping altogether too early. When a berry is too young it will wilt very soon. It is my opinion that the gooseberry limit has been reached. I think the market is quite limited.

Is it advisable to grow small fruits at any time between rows of fruit trees?

Prof. Slayton: If you hadn't said small fruits, I would state to the audience that on the 12th of June, 1896, I was in the office of the president of the Michigan State Pomological society, and was told that he had forty acres of fruits (that is where the word "small" bothers me)—muskmelons and canteloupes—growing among fruit trees. If he does it, I suppose it must be proper.

Mr. Judson: I find that it pays pretty well. It may be that the young trees will not grow quite so fast; but so far as I am concerned, I don't want a young tree to grow very fast. I think if they grow slower they are longer lived. A tree that grows too rapidly dies quicker. I think a medium growth is better, and I find it desirable to have a little profit off my land the first few years of growth. Then, in case a peach crop is a failure, it is desirable to have a few strawberries or raspberries between.

Mr. Morrill: Are you not likely to have a failure in your peach orchard if you follow this plan?

Mr. Judson: I think there are very few who have peaches when I don't.

Mr. C. E. Hilton: I think it is Downing who recommends such fruits as raspberries and blackberries to be grown in young orchards, especially in apple orchards, for the purpose of driving the roots of the larger fruits deeper into the soil. Where soil is of the proper depth and texture to take a deep root, we have this authority, and I think it is very good advice. Mr. Judson is all right; it does retard the early, rapid growth, which in my estimation is sometimes an advantage.

Mr. Staehlin: I have had a little experience in this matter, and I find that in the part where I set strawberries the growth was retarded considerably, in some cases so much that the trees are entirely absent at the present time.

Mr. Morrill: I believe there never was a fruit patch grown in an orchard but that the orchard suffered. You may grow strawberries successfully, if you want to sacrifice the orchard, but I think it is better to grow strawberries in one field and the orchard in another. I am perfectly satisfied of that from observation and experience, and the idea of forcing the roots of a peach, or those of any other tree, to go where they do not want to, doesn't seem to me a proper practice. It seems to me that the proper practice is to encourage them to grow and do well wherever they naturally go. Mr. Judson said something about a slow growth. That is very good and all right, but I want just as large a growth as I can get, if I get it at the proper time. In May, June, and July, I want my tree to grow; after that, I want it to ripen, and if I can secure that, I don't care how big the growth is.

Mr. VanDeman: I think the argument is good.

Q. Can you force the ripening?

Mr. Morrill: I can, by getting the growth as early as possible, by early crowding and then ceasing cultivation. But if people, in the cultivation of their orchards, wait until everything else is done, and then commence the growth of the orchard, which you can do by your culture, and then carry it along a little too late, injury is likely to result.

Q. Aren't they more easily killed by frosts?

A. I don't care how big they are, if they will ripen at the right time; but if they start in June the growth they should have started in May, and ripen the growth in September that should have been ripened in August, then the bigger it is the worse you are off. There is quite a difference in the details in regard to these things. I believe we should get the benefits of what we do at the earliest possible moment. We have no assurance of life for any great length of time, and I like to get results while I am in the business.

Mr. VanDeman: As to the growing of peaches and apples together, or peaches and pears, or any of the orchard fruits, and not mixing the different species, I want to know what is the experience. I hope that those who have experience here will state it plainly, that we may know. I want to know specially what is the actual state of the case here. I know something of the experience in other places, but I want to know what you think.

Mr. Winchester: Most of the men who have gone into the fruit business here are men with small places. They do not have two or three hundred acres, and in order to get started they find it necessary to get an income from the place in a short time. The orchards grow more slowly, where small fruits are grown, but I have not seen any damage to the orchards. In all the orchards along the lake shore there are small fruits grown. Of course, where a man has a great deal of land, like Mr. Morrill, and is able to do it, I should say, by all means, set only one kind of fruit.

Q. What about the mixing of orchard trees, peaches and apples?

A. That was done a few years ago, when our people thought the peach orchards were going to be short-lived and that apples were going to be the leading crop. It was the custom then to set a quarter to apples and the balance to peaches. Now we find that where peaches do best apples will not do as well.

Q. Does the apple hurt the peach or the apple the pear?

A Member: I bought a place here thirty years ago. The peach trees were twenty-three years old and the apple trees the same. The peach trees had grown up to top and were just about worthless on that account, but they grew elegant peaches, only they were too high up to be easily reached. But if a man handles land as Mr. Morrill does, and has the means to wait until he can grow the trees, I would say by all means to grow one kind of fruit at a time.

Mr. Sherwood: My father set an apple orchard in the centennial year (1876) and he set forty feet apart, with pear trees between, and up to last year, I didn't notice any damage. But now I think that within a year or two I will have to cut out the pear trees or they will die. The trees are beginning to show the drain on them of the apple trees. I think it is due to the soil being weakened by the apple trees. I am satisfied that the apple is stronger and robs the other.

Mr. Smith: It is the universal practice in this country to grow small fruits among our bearing fruit trees until the trees begin to bear. Of course, this depends, too, upon the nature of the soil. There are some light soils which will hardly bear even one variety of fruit successfully, without fertilization, while other soils will bear almost anything you put

on. We have land on the lake shore here that is somewhat peculiar. The nearer we get to the lake shore, the more valuable the soil. Now, for the last fifteen years, I have practiced planting pears and peaches alternately on certain spots. The soil will be composed in some places of a light sand, in other places sandy loam, then again there is hard clay, and there is some low ground where the soil is naturally heavy and strong. When I come to a spot where the ground is too heavy for the peach, I set a pear. I have a pear tree here and a peach tree next, and I find that the pear trees set among the peach trees have borne better crops for the last ten years than where they stood by themselves. I hardly ever miss getting a full crop from these trees, and the peach trees bear all they can, so there certainly can be no detriment to either. They are sixteen to eighteen feet apart, between peach and pear.

Mr. Pixley: I have seen it recommended that we set fruit trees indiscriminately, of variety—apples, pears, peaches, cherries, and plums; let them grow in our orchards as the forest trees grow, where oak, beech, and basswood are all mixed together. Each one requires a little different nourishment from the soil, which it selects. My orchard was set alternately with peaches and apples. The peaches are a rod from the apples. There are pears, mixed in the same way. The pears always seem to do well. The peaches grow and pass out. The apples and pears stay. I have no definite experience with this, however,

Mr. Morrill: I think there is just one test you can apply to that, which will satisfy the most of us. Pick out ten of the best peach orchards you know, and has there ever been any alternate variety set with them? Pick out the best ten pear orchards, and see if there has been anything between rows. The same way with apples. Did you ever see anything planted alternately in the best orchards? I am not referring to pollination of different varieties of a kind, but of alternating two kinds of fruit on the same ground, and I would like to know if there is any locality which can show its best ten orchards, of any kind, which have ever been mixed with fruit of any kind. The question of growing small fruits admits of a good many variations. My observation is that, with most of our tree fruits, the strawberry crop is a very severe one and has ruined a great many orchards. The raspberry crop is not so injurious, and the blackberry least so of any. In my own practice, I have set currants with pear trees, because my observation has been that they are the least injurious to these trees of any crop I can grow, and I can grow them five or six years, by giving them an abundance of food. You can plant currants with pear trees, but I always take them out as soon as the pears begin to have profitable crops. I grant that there is necessity, often, of reaping something off the ground, and also that all men can not wait, but some allusion was made to my ability in this direction. When I commenced on my ideas, there never was a man in this county poorer than I was, but I have followed the idea of giving an abundance of feeding room to anything I set, believing it was the best way, and I have scratched out a living wherever I could. I think we should look into the detail of these things a little.

Mr. Matraw: I have had a little experience in raising fruit for the last thirty-six years, about nine miles away from the lake, and I have had a

little practice in the mixing of trees. The plan worked well until the trees got a certain growth, and after that not so well, so I prefer now, with the little experience I have had, to divide my orchards of all kinds, and I would do this certainly if I grew extensively. You can take care of your orchards cheaper by having them divided.

Mr. Spink: I don't think I have made a success raising small fruit with tree fruit, even where I set one row. I set my peach orchard, for instance, sixteen feet apart, and put one row of blackberries in on one half of the orchard. Well, the half which wasn't set with blackberries bore enough better to more than offset what I gained from the blackberries. I have also set apples and peaches together, and on the whole I don't think I have made a success of it. Still, strawberries, one or two years, will do, but most of the other fruits seem to be a detriment by the time they come into bearing. I think they are more of a detriment to the tree than a profit.

Mr. Merry: I have made a practice of raising some small fruits among my trees. I have a pear orchard of between three and four hundred. I set pear trees into a blackberry patch. The rows were seven feet apart. The trees are 21 feet apart— 20×21 . The trees and the blackberries have both done well. The past year I have taken some of the blackberry plants out, those that were nearer the trees, and I shall continue to take them out as I see they draw on the trees.

Mr. Cunningham: My experience in planting small fruits among the larger fruits is that it is a failure, if you want the larger fruits. I noticed last season, in the peach market in Chicago, there were thousands and tens of thousands of baskets of peaches dumped into the Chicago market that were worthless. The planting of strawberries among the fruit trees has been mentioned. Now, by the time a strawberry crop has been gathered, the ground will be so thoroughly dried and tramped down, that it will be almost impossible for the trees to get any moisture. It is just as impossible to get good peaches from such an orchard as from a stone. Now, there was a cause for the quality of those peaches which were dumped on the Chicago market, and I think we may look for it in some such ways as this.

Do you use commercial fertilizers more here, or manures?

A. Commercial fertilizer, barnyard manure, and ashes, all are good, if we have moisture; but when we have such a season as we had last year, no amount of commercial fertilizer will help. The peaches will be small anyway.

Mr. Rose: I beg to differ with the gentleman, because I think it depends largely on the nature of the soil, where you feed it in proportion to the fruit you take off.

A. That would hardly affect the growing of two kinds together. Perhaps the use of plenty of fertilizer, and spraying and giving them plenty of room, plenty of feeding ground and culture, might pay. I think it would.

Do you advocate spring or fall setting of fruit trees, and would it be more desirable to heel in trees for fall setting?

Prof. Slayton: Early spring setting is best. Fall purchasing for apple, pear, and plum, and heeling them in on your own premises.

Let me ask a question. Has anyone here tried irrigation?

A. I think only in a limited way. There may be some here who have used water, but I doubt if it has been applied in any quantity. Mr. Hawley tried it and it was quite satisfactory.

Mr. VanDeman: By what means, gravitation or pumping?

Mr. Morrill: He had a small engine, and pumped the water up, and had mains running through his peach orchards, and furrows to the trees. He turned on the water and irrigated six or eight rods at once. Then he had another row of mains, and so on. I know he has a very fine peach orchard.

Mr. VanDeman: I presume you all know that irrigation is one of the recent industries in the east, one of the big questions. It is coming. Now, it all goes back to this one point, that plants live on soup, and you can not make soup without water, and if you can not get water from the clouds at the right time you would better get it somewhere else. That is the reason we can not raise more, because we haven't water at the right time to furnish the soup I speak of; that is a fact, and the sooner we realize it and act upon it the better. Thorough cultivation has a close connection with irrigation, because it furnishes escape for the water into the ground and prevents its escaping and going off into the air. We put a dust blanket over the top of the ground, and the moisture can not escape into the air except, of course, through the leaves of the trees. We wish to stop this evaporation and keep the moisture in the ground where the plants can feed upon it. Irrigation is only a help, an aid to nature, but it is going to be a very important feature of the horticulture and agriculture of this country before a great many years. Mr. Hale of Connecticut has fifty acres under irrigation now. He spent over \$2,000 last fall in putting in an irrigation plant. He tapped a little creek up in the mountains, nearly a mile from his place, and now he can laugh at the drouth in New England. Mr. Eddy of Connecticut figured up that he got \$14 per barrel for the water he put on his place, which was absorbed by the fruit.

Mr. Pixley: One of my neighbors put some pipes into his peach orchard last year. He had the city water pipe attached, and a motor put in, and he put in the necessary pipes to distribute it around a few of the trees; and he tells me he found it very successful indeed; that he increased the weight of the peaches very much over those peaches which did not get any water, and at a very small expense. The city furnishes the water at twenty cents per thousand gallons, about one cent for three barrels, and by using common iron gas pipes he distributed it with small expense.

Will spraying with Bordeaux mixture prevent rust of strawberry foliage?

Mr. Merry: Two years ago this summer I had a strawberry patch that commenced to rust; and, being told that Bordeaux mixture was a preventive of rust, I began applying it. My barrel gave out before I got all over the piece; perhaps I had eighteen rows left, and I promised myself that in the morning I would go back. I failed to do so. In a few days I noticed that the portion of the patch which I had sprayed was rusting badly. The pickers said that on the part which had not been sprayed the berries were better.

Mr. VanDeman: Was it all the same variety?

A. Yes, the whole patch was alike, and had the same treatment. You could see the difference as far as you could see the patch.

Mr. Morrill: I never had any experience in that line, though I have heard many people speak of it and say they couldn't control it.

Mr. VanDeman: It occurs to me that, as the gentleman has said, it might be that his spraying injured the foliage, and that the injury to the foliage would cause a corresponding injury to the fruit. It might be, too, that the germs of the rust were already working more vigorously on that part which he happened to spray than the other part. It might be owing to some other conditions. Perhaps it was just luck. If I had to guess at it, however, I should attribute it to something in the mixture which injured the foliage.

Mr. Merry: This was rust. There was no injury to the foliage. The rust spots appeared. You could see them anywhere, and there was no difference in the patch. It was rust, no burning about it.

Mr. VanDeman: Had the rust begun before you sprayed? A. Yes, sir.

Mr. VanDeman: Well, then, the mischief was mostly done. That brings out one idea that everyone would do well to consider; that copper sulphate used in spraying is not a cure for many of these things, but is a preventive, and when used after the damage begins to show is almost absolutely useless. It may prevent spreading, but it will not cure most of these troubles after they have once gotten a start.

Mr. Morrill: This brings to my mind what Lawrence Farmer said at Rochester. He has a plan of growing strawberries in a country in which rust is troublesome. He beds the plants in thin rows, for a month or two before setting, in the fall, and one of the greatest advantages of this is the ability to spray them three or four times with Bordeaux mixture before he sets them in the field. He takes them up and heels them in, sprays them two or three times, and then sets them out, early in June. Now, that would be a peculiar statement to our strawberry-growers, but he is said to be one of the most successful growers there is. But that is one of the strong points he makes. He does not have to go over the whole field, but he has the plants right there where he can get at them with the spray. Like Prof. Wheeler, one must confess to being unable to tell why certain methods do not always succeed, or why others do. I can not tell you the reason, I only know the facts. That is true in many of these instances. No man can tell us why these things are so, but we know a thing can be done, because we know it has been done. You may fail doing it, and perhaps we can't tell you why.

PROCEEDINGS OF THE ANNUAL MEETING.

HELD IN GRAND RAPIDS, DEC. 1, 2, 3, 1896.

Seldom has there been a more noteworthy convention of horticulturists in Michigan than the twenty-sixth annual meeting of the State Horticultural society, held in Grand Rapids, December 1, 2, 3, 1896. It was notable not alone for the very large attendance, representative of all portions of the state, but as well for excellence of the programme, the new features which were introduced, and the deep interest that was taken at every stage of the proceedings. The sessions were held in one of the circuit court rooms in the Kent county building, which was handsomely decorated with ornamental plants and chrysanthemums. Two adjoining rooms were devoted to the exhibition of fruits and flowers, which were in abundant supply. Several hundred persons were in attendance each session, the evening sessions bringing out numbers of the city people interested in rural affairs. Each hour of the meeting was actively occupied with some feature of the programme or the discussions which it provoked, and there was no lagging of interest from the very beginning.

Among the gentlemen in attendance from outside the state were Mr. J. H. Hale of Connecticut, Prof. M. V. Slingerland of Cornell university, and Prof. John Craig of the central experimental farm of Canada. These gave valuable contributions to the proceedings, and never has the society had more efficient aid from horticulturists from other states than its own than was rendered on this occasion. Besides these were Mr. E. A. Riehl of Alton, delegate from the Illinois state society; Mr. J. J. Harrison of Painesville, Ohio, of the famous nurseries of Storrs, Harrison & Co.; and Mr. M. A. Thayer of Sparta, Wis., the small-fruit specialist. Perhaps at no meeting of the society was there ever a larger attendance of prominent fruitgrowers from outside the vicinity of the meeting. All of these gentlemen were made honorary members of the society for the year 1897, and one after another was introduced by President Morrill and decorated with the handsome badges which had been provided for the occasion. They in turn made felicitous remarks, showing their appreciation of the honor conferred.

The annual election occurred Wednesday afternoon, and was completed with extremely little use of form or time. President Morrill, who was absent because of temporary illness, was unanimously re-elected,

the secretary being instructed to cast a ballot for him, though this was known to be contrary to his wishes. In like manner, Secretary Reid was elected, the casting of the ballot being done by Vice-President Monroe. A similar compliment was paid Mr. Asa W. Slayton, treasurer. The matter of choosing two members of the executive board was referred to a committee, consisting of Ex-President Lyon and Mr. J. F. Taylor. Upon receipt of their report, the secretary was instructed to cast the ballot of the society for the re-election of Messrs. F. J. Russell of Hart and R. D. Graham of Grand Rapids, as members of the executive board. At a session of the board the next day, Mr. R. M. Kellogg of Three Rivers was elected a member in place of Mr. Elmer D. Smith of Adrian.

It was expected that the West Michigan Fruitgrowers' society would hold an election of officers at this time, but Secretary Kellogg announced that the matter had been postponed until some possible future meeting.

The usual committees were appointed Wednesday morning, as follows:

Resolutions—W. W. Tracy of Detroit, J. F. Taylor of Douglas, W. W. Rork of Agnew.

Exhibits—Prof. L. R. Taft of the Agricultural college, Mr. J. J. Harrison of Painesville, Ohio, Prof. John Craig of Ottawa, Canada.

To these were added the committee on legislation, consisting of Messrs. R. D. Graham of Grand Rapids, C. J. Monroe of South Haven, and Edwy C. Reid of Allegan. These are to concern themselves with all proposed legislation relating to horticultural interests, and especially such as will secure active repression of diseases, predatory insects, and the importation of unsound nursery stock into the state.

A pleasant feature of the meeting was the presence of a number of the florists of Grand Rapids, two of whom furnished valuable papers. These were Mr. N. B. Stover and Mr. Henry Smith. Another innovation was use of a stereopticon. This was employed at the session Tuesday evening to show the portraits of Mr. S. L. Fuller, the first president of the society, and Mr. T. T. Lyon, the honorary president, and who is justly revered as the society's patriarch. These had been referred to in Mr. Garfield's opening address of welcome, who paid a deserved tribute to their services in establishing the society. In turn, Vice-Pres't Monroe, in reply to Mr. Garfield's address, told of the valuable work performed by that gentleman during the number of years he was secretary of the society. Mr. Garfield's portrait was shown, evoking, as did the others, very hearty applause. The instrument was also used that evening in illustrating the brief address of Prof. Craig on the "Fruit resources of Canada." Mr. Craig exhibited a number of views of Canadian fruit, orchards, and portions of the experimental farm at Ottawa. These, with the papers by the florists, made up an evening of unusual enjoyment. Wednesday evening the stereopticon was again brought into use to illustrate Prof. Slingerland's lecture, "Recent work among our insect enemies," and Mr. Morrill's "Pruning of peach trees."

There was a lively episode when Mr. Lyon brought up the matter of the society's action with relation to the proper person for appointment as secretary of agriculture in the cabinet of President-elect McKinley. Mr. Lyon stated that much anxiety was felt among the horticulturists of the country because of fear that the person selected might be simply a specialist of some kind and one not broad enough in his knowledge to

properly appreciate the needs and importance of other branches of agriculture than that in which his own liking had schooled him. He spoke of three principal candidates, Mr. Brigham of Ohio, Mr. DeYoung of California, and Mr. Hoard of Wisconsin. The appointment of the former, Mr. Lyon thought improbable because of his residence in the same state with the president, although selection of Mr. Brigham would be satisfactory.

Remarks upon the subject were made by Mr. Hale and Mr. Garfield, the latter recalling the influence Mr. DeYoung exercised against the interests of all but California horticulturists in connection with the World's Fair. The discussion ended in appointment of a committee and adoption of a resolution. The committee consisted of Messrs. Lyon, Monroe, and Garfield, who were instructed to confer with horticultural societies in other states, and act in concert with them in selecting and recommending an appointee who would have the best conception of the importance of horticulture, and would see that it had its due share of attention in the work of the department. Subsequently the following resolution was introduced and unanimously adopted:

The Michigan Horticultural society, assembled in annual convention, having appointed a committee consisting of President T. T. Lyon, C. J. Monroe, and Chas. W. Garfield, charged with the duty of memorializing President-elect McKinley with reference to the selection of a broad man for secretary of agriculture, who shall adequately appreciate the large place that horticulture occupies in the agriculture of the nation, desires to record its loyalty to a man in the middle west whose utterances, work, and influence have for years been on the side of progressive agriculture, and who, while especially championing the great dairy interests, has never neglected to acknowledge that horticulture is a leading factor in the evolution of American agriculture; therefore,

Resolved, That we heartily endorse the candidacy of Ex-Gov. Hoard of Wisconsin, for the position of secretary of agriculture in the cabinet of the incoming administration.

A petition of fruitgrowers of St. Clair county was presented, reciting the unequal conditions sustained by the fruitgrowers of the United States, along the Canadian border, with relation to the tariff laws of the two countries. While nursery stock and many kinds of fruit are admitted to this country entirely free of duty or under a very small tariff, Canada imposes heavy rates upon all such products. The result is that American growers are largely excluded from Canadian markets, while the markets of the United States are free to Canada. The manifest unfairness of these conditions was discussed, and action taken by adoption of the following resolution, submitted by the committee to whom the petition had been referred:

Resolved, That the secretary of the society address each of the Michigan representatives in the United States senate and house of representatives, as follows: The Michigan State Horticultural society, in its annual meeting, in Grand Rapids, Dec. 2, 1896, respectfully calls your attention to the tariff laws regarding summer fruits, vegetables, and nursery stock, which, as they now exist, allow these products to be shipped into the United States from Canada duty free, while our own gardeners and farmers are required to pay duty for sending such products into Canada, amounting, in the case of berries, to two cents per pound, and correspondingly large duties upon all other such fruits and nursery stock. We submit that this is a hardship and a tax upon our people, from which they should be

relieved, and we ask that you give the matter immediate attention, with a view to so amending our laws as to correct the evil.

W. W. TRACY,
J. F. TAYLOR,
W. W. RORK,
Committee.

During one of the sessions, a surprising statement was made by Mr. Garfield, to the effect that Michigan horticulturists are paying from \$25 to \$50 per ton for fertilizers imported from Germany, while the Germans themselves are using a fertilizer made from the refuse of the "sticky fly-paper" factory in Grand Rapids. The chemical analysis of this product, which is ground and pressed castor beans, very nearly corresponds to that of the best oil meal. It is shipped to New York and exported thence to Germany.

REPORT OF COMMITTEE ON EXHIBITS.

We find in the exhibition hall several fine collections of fruits, flowers, and plants, and recommend the following award of premiums:

For market fruits, first to E. C. Phillips of Grand Rapids for fourteen plates of very well grown and carefully selected specimens of valuable market sorts, including Hubbardston, Ben Davis, Grimes Golden, King, R. I. Greening, Wagener, Northern Spy, Red Canada, Baldwin, Johnathan. Second to Robert L. Value of Allegan, for seventeen plates, including Stark, Pewaukee, Northern Spy, Ben Davis, Black Gilliflower, Lowell, Baldwin, Mother, Red Canada, Ribston, Pound Sweet, Peck Pleasant, Munson Sweet, and Gideon. The latter are large and well-grown, but the variety is very likely to rot at the core.

In the dessert class we award the first to R. L. Vahue, Allegan, for Canada Red, Golden Russet, Norton Melon, Shiawassee, Wagener, Fall Pippin, Famine, Green Sweet, Grimes Golden, Rambo, White Pippin, Yellow Bellflower, Hubbardston, Gravenstein, Jefferis, Esopus, Westfield, Sweet Russet, Golden Russet, Detroit Red, in addition to the Vicar pear. The second premium we award to E. C. Phillips of Grand Rapids for Hubbardston, Grimes Golden, Wagener, Northern Spy, Jonathan, Wealthy, King, Canada Red, Shiawassee, Bellflower, R. I. Greening, Talman Sweet, and Fall Pippin, thirteen plates.

Fruit for exhibition should be of a characteristic form and color, even in size, and free from spots.

We also find a plate of well-grown Hubbardston shown by L. R. Davis of Crosby.

Several plates of new or little-known varieties were shown. Among them are: Sutton Beauty, sent by S. D. Willard of Geneva, N. Y. They are a medium-size, roundish apple, yellow in color and overspread with red in stripes. The flesh is firm, yellowish white, very crisp and juicy; quality good but not high. It bids fair to become a valuable market sort for this state.

Arkansas Black, shown by A. J. Pearce of Grand Rapids. A medium-size, oblate, handsome variety of the Blue Pearmain type in appearance. The flesh is firm, even to woodiness; quality poor; evidently a good keeper. Your committee are doubtful regarding the advisability of introducing varieties of this grade of fruit.

Wismer's Dessert, exhibited by J. H. Wismer, Port Elgin, Ontario, Canada; medium size, round, obscurely five-sided; yellow, shaded with red in stripes and blotches; marked with russet dots; basin deep, corrugated; cavity deep and narrow; calyx closed; flesh yellow; firm. Remarkable for its melting juciness; mild, sub-acid. Season, in good condition now. It appears to be a dessert variety worthy of trial.

Your committee, in connection with this, wish to discourage the use of long descriptive names in the introduction of new fruits.

A. P. Green of Eaton Rapids shows a plate of Oakland County Seeknofurther; of medium size, round, flattened, dark red with very dark splashes; flesh white,

texture soft, very mild, sub-acid; season late autumn. An apple of great merit for home use or fancy markets.

B. E. Rickert, Saranac, Mich., showed a fine basket of Carman No. 1, a large, oblong, white potato, fairly smooth and with moderately deep eyes.

Mrs. Lee Lewis of Corning, Allegan county, exhibited baskets tastefully filled with everlasting flowers and ornamental grasses, the whole making an instructive exhibit of plants that can be used for this purpose with good effect.

Henry Smith of Grand Rapids has decorated the court-room with a fine collection of palms and other ornamental plants, and we award him the first premium of \$5. The second premium is given to Crabb & Hunter of Grand Rapids.

For the best display of chrysanthemums in pots, the first premium is given to Crabb & Hunter, for a fine standard and twelve large exhibition plants, and the second to Henry Smith for twelve well-grown plants in six-inch pots. In the class of cut chrysanthemum blooms we give first prize to Henry Smith for several fine blooms of leading varieties.

The first premium on cut roses is also given to Henry Smith; the second premium is given to Crabb & Hunter of Grand Rapids.

The first premium on cut carnation blooms is given to Henry Smith and the second to Geo. Hancock & Son of Grand Haven, for twelve varieties. The latter exhibits several seedling varieties, some of which seem to have much merit.

The Stover Floral Co. of Grand Rapids show three vases of carnations, and deserve special mention; also what is known as the Creelman carnation support, invented by Mr. J. Creelman of Grand Rapids, which consists of a spiral coil of wire supported by a wooden stake. It is cheap, durable, effective, and does not hinder in cutting the flowers.

The Murillo carnation, a new seedling, is exhibited by the originators, Hopp & Lemke of East Grand Rapids. The plants are evidently strong and vigorous. The foliage is very large, and covered with a thick bloom, apparently little subject to rust and other fungous diseases. It has long, stout stems, generally with single flowers, which are very large, full, and of a very rich, deep red. The calyx seems strong, the petals are well fimbriated, and the odor is a distinct clove. If it is as floriferous elsewhere as it appears at its home, it is certainly one of the best varieties of its color.

Mrs. Peter J. Coppens, 234 Ottawa-st., Grand Rapids, has brought and placed upon easels in our place of meeting several paintings in oil, the subjects being fruit of various kinds.

JOHN CRAIG,
J. J. HARRISON,
L. R. TAFT,
Committee.

REPORT OF COMMITTEE ON RESOLUTIONS.

Resolved, That we, as individuals and as a society, extend our thanks to the officers and members of the Grand River Valley Horticultural society, Grand Rapids Fruitgrowers' association, Grand Rapids Florists' club, Lowell Horticultural society, and West Michigan Fruitgrowers' society, for the well-directed efforts which have made this meeting such a success.

That we thank Judge Grove and the committee having charge of this building, for the use of such a pleasant place of meeting; that we thank the custodian and the janitors of the building for their uniform courtesy.

That we thank the members of the press who have added to the value of the meeting by such prompt, full and accurate reports of its proceedings.

That we specially thank the gentlemen from other states who have contributed such enjoyable and useful papers and otherwise added much to the usefulness and pleasure of the sessions.

W. W. TRACY,
W. W. RORK,
J. F. TAYLOR,
Committee.

PRESIDENT MORRILL'S ANNUAL ADDRESS.

For long shipments of fruit we must have a better package than we have been using, and it does seem as if by some means we should be able to break the combination formed against us last spring by which they elevated the price of packages twenty-five per cent. in the face of one of the heaviest crops and in the hardest times we have seen for years. I think by starting in time we can do so. I am not going into details, but you have various associations over the state which must take care of their local business, but the State society's business is to assist in every way possible in making our conditions better, and that is one of the methods by which we could assist. The price of packages in which peaches and grapes are shipped was raised by the combination from 15 to 25 per cent., and the sales have been enormous and the profits have gone almost entirely on the general fruit crop—I would say almost entirely—to the package and transportation people. There is something there for us to consider, and we must go at it with a spirit that means something. We must not meet and discuss these things now and go away from here declaring that everything is wrong but we are not prepared to join with our neighbors to try to right the wrong. We have the power, we can do it if we see fit.

The question of distribution is another matter of which you have sorely felt the need this summer. It is only fair to say that our distribution is very much better than it was two or three years ago. It is being rapidly improved. You people at Grand Rapids have done more than those of any other locality in the state. They have a shipping association here whose work has accomplished a great deal. I think it has accomplished wonders, for the poor support it has received from the fruitgrowers of Kent county. I am only talking to the men who do not support it, and I wish to say to any man present who grows an acre of fruit and has not taken an active interest, a financial interest, in this fruitgrowers' association, I am heartily ashamed of you. I think it is wrong. I am satisfied, although I can not prove it, that the operation of that association for two or three months this year put a thousand dollars into the hands of the fruitgrowers of this locality every day, and possibly twice that. I presume that is a low estimate. How does it come that the papers read here today show that that association has such a limited membership? A few men have to put up whatever money is furnished. There is some expense; they are not working for salaries, but there is correspondence, stationery, rent of office room, perhaps, and some incidental expense, not much, and that is all that the fruitgrowers are asked to pay for. But how many do it? They tell me it is but a handful, they who have developed this market at Grand Rapids, and you know you have the best market in the state. In my own town, which perhaps ships more fruit of all kinds than you do here, we have never succeeded in getting such a market system as you have, and this very market system has brought the buyers to you, has taken away the dissatisfaction of commission dealers, and has given the money to you for your fruit the same day you delivered it; and it goes into circulation the same day and has been worth thousands and thousands of dollars to you.

The transportation problem is another thing which you people at Grand Rapids have done more for perhaps than any other part of this state. It is something which yet must be very much improved. It seems to be a very difficult thing to fight a transportation company down on rates, but there are two ways of improving this. If you can not fight them down on rates, fight them up on service and get your money in that way. Our friend Hale made a statement just before dinner that fits that case exactly. He said, "I don't attempt to fight the companies down on rates, but I fight them up on service." I think that covers the ground so neatly. He says to the companies whom he patronizes, "If you will give me superior service I can get enough money out of the product to pay for it." Now, there is an idea perhaps that has not occurred to a great many people. I know this, that the man who is constantly looking for something cheap is very likely to get something so very cheap that he does not like it, because there is somebody around to accommodate him; and I don't know but it holds good in railroad transportation. Consequently, if in fighting these large traffic associations—I won't say fighting—in attempting to reduce their rates, you find that you have run against a snag, you have run against agreements that exist which they find very difficult to break from. If you can not accomplish anything in that way, work the other—fight for better service, fight for more rapid service and more prompt delivery. Then you can get out of the increased prices what you failed to get in rates, and I think it is an excellent idea. I think it something for your association to work on, I think it is something for all associations to work on.

We have had a season peculiar in the absence of fungous and insect troubles. That is generally conceded. There has been a little question in my mind whether there was any absence of those pests, or whether there was such an abundance of fruit that the distribution of the germs or insects affected so much less fruit in proportion to the whole that it was not noticeable. I know that many people have thought, or did think early in the season, that even in the case of their apple crop it was not necessary to spray, as no scab developed. I know that later on scab did develop, and I know that many of the people who believed that early in the season have changed their minds radically now, because they found scab developed on their apples later in the season and their apples are not keeping; while all the good storage apples in Chicago today are from orchards thoroughly and persistently sprayed. While there is no topic on the programme regarding spraying, I wish to say that the best results I have seen are where spraying was done before there was any sign of foliage. I presume the subject will be taken up, but I don't know. According to my observation, the main trouble with spraying has been commencing too late. People should get it into their minds as a fixed fact that where it is any benefit whatever it is as a preventive and not as a curative. You can not spray for scab and destroy it after it has a foothold. You can not.

There was considerable evidence last winter that spraying had proven a remedy—not a remedy, a partial preventive—of peach yellows. Those gentlemen who have been pressing it for other purposes in the yellows districts have discovered that yellows was not anywhere nearly so strong

in the portion sprayed. I presume it is good practice. I don't know that it is sure practice, though. I am a little skeptical of that yet, but there seems to be good evidence of it, and there is something here worthy of investigation, and it probably will be investigated.

There is another element that is entering into our fruit business just now that will be semi-political. I do not wish to say to you that I am going to put anything political into this meeting, but we are getting a practical illustration today of the benefits of protection, or rather the lack of benefit where there is a lack of protection. We have a sample in this manner: Chicago is our leading market, and the price in Chicago practically establishes the price on apples in this entire country. Thousands of barrels of Canadian apples, which I regret to say are better grown and better packed than ours, and in full-size barrels always, have gone upon the Chicago market, and the present tariff fixes an ad valorem duty of twenty per cent., while the McKinley bill fixed a duty of twenty-five cents per bushel specific; and we know that no barrel of apples could get across the line without paying a duty of seventy-five cents. Now, that affects the valuation; that fixed the value of Canadian apples at forty cents per barrel at the beginning of this season. The big steamboats, the big grain liners on lake Erie, fixed the rates from Buffalo and Canadian points at five cents per barrel delivered in Chicago. They fixed the valuation at forty cents per barrel, which provided a tariff of eight cents per barrel in lieu of seventy-five cents under the McKinley bill. The consequence has been that all the market furnished, or the best of it, has gone to Canadians. Now, while I have all the respect in the world for Canadians, insofar as my acquaintance goes, as being as fine people as there are in the world, I do like to see the American market held for American producers, especially under such a strain as we have had for a year or two. I do not think it is necessary to say any more about this, except that recently the authorities have taken the matter in hand and have raised the valuation of those apples to ninety cents per barrel, and are collecting about eighteen cents per barrel in duty, which is a slight improvement; and I will say further that my opinion is if the McKinley bill was in existence it would mean from twenty-five to forty cents per barrel more for every barrel of good marketable apples that Michigan puts into Chicago or any other town. I think that is what we are paying on account of the present tariff bill.

As against that, Canada had an excellent market for peaches this year, and what did it cost you to get there? Some of you Grand Rapids gentlemen know. You tried shipping there, and my recollection is their tariff charge was fifty cents per bushel. Am I right? Will some Grand Rapids man tell me? If Mr. Graham was here he could tell me in a minute.

A Member: I think it was sixty cents per bushel.

The President: The Canadians have much more sense than we. If we ship peaches there they are going to make something out of it. They raise a few peaches over by the Niagara river and country tributary, and they take good care of the Canadians who grow them. That is right, and we are at a disadvantage in the whole deal.

SECRETARY REID'S ANNUAL REPORT.

First, as to the financial condition of the society, there was a balance on hand at the close of the last fiscal year of \$14.86. The treasurer received from the secretary, Dec. 5, 1895, annual memberships, \$27. Later, interest on the Jacob Snell mortgage, \$21.00, on the Newman mortgage \$17.50, the Carlisle mortgage \$86.21, the Samuel Gear mortgage \$21, and latterly, from the secretary, at the conclusion of the year, annual memberships, \$19, making a total of \$333.57. He has made disbursements amounting to \$26.28. He has received also, by way of interest on the deposits of the society's funds, \$2.42, (there is some accrued interest there subject to credit to the society at present), making a balance now on hand of \$309.71. This, you understand, is the fund of the society outside of its annual membership fund, which is the amount that is invested and from which this interest is derived. There was during the year one life membership of \$10, which has been passed to that fund, which does not appear in this balance.

You all understand, I presume, that the expenses of the society the past two years have been paid from the state appropriation, and we have been able to accumulate this little sum of money. We hope to receive the aid from the state which is commonly extended each year in the horticultural states of the Union. That amount is \$1,500, the present year and the one preceding. It will be subject to legislative action at the approaching session, and our chances of renewal of it I should suppose would be good. We will be able to show a wise expenditure of the portion of the funds we have used. Under the state law any portion of the annual appropriation which is not used within the calendar year lapses to the state. In that way we turned back to the state, the first of last January, a little over two hundred dollars, and we will return something this year, we don't know exactly what. In return to the state for that appropriation we shall be able to show the holding of much more valuable meetings than the society was able to provide before. We have been able to bring to our meetings within this time much valuable aid from outside the state. It is only by means of this appropriation that we can bring to us such men as Prof. Bailey of Cornell university, Prof. McClure of the experiment station of Illinois, Prof. Webster of the Ohio experiment station, who were present with us at our last annual meeting; and Prof. Slingerland of Cornell university, Mr. Craig of the central experimental farm of Ontario, and Mr. J. H. Hale of Connecticut, who are or will be in attendance upon this meeting.

During the past year we have held two meetings aside from this, one at Hart in February and one at St. Joseph in June. Both of those were very largely attended and both were very successful in all points in which horticultural meetings can be successful.

It has been a quiet year among the local societies of the state. There has been but one such new society formed, so far as I have been aware, and that at Grand Haven. It started last winter under very favorable auspices, but like all such societies it has done but very little work during the summer season. As you are aware, fruitgrowers are very busy during

the summer, and particularly this summer trying to save a little out of a great deal, and so there have been but few meetings of the local societies, and they do not seem as yet to have revived very much. It is presumed that they will, however, as the season's work is through, and I know no reason why they should not be as vigorous and interesting the coming winter as ever.

There was this season a particularly large fruit crop. There seems not to have been a fruit tree nor bush nor vine nor plant but did its utmost to provide a full crop, and as a rule the crop was of good quality. How it sold we are all too painfully aware. The result of that has been a check to the selling of nursery stock, as I have been informed by nurserymen, and I know that the feeling among growers is not as it was one year ago at this time—a disposition to plant to the uttermost their entire capacity of land. Whether this is on the whole advisable and desirable is a question that would awaken discussion in this meeting, and a very distinct variety of views. There are horticulturists who would like to see horticulture restricted, and who think if we produced one half as much as we do produce in any one line it would be very much better for the grower. Perhaps that would be true in a narrow and selfish sense, but it would not be true, as many of you would maintain, so far as the general benefit to the public is concerned; and ultimately, whether it would be to the grower is another interesting question.

At any rate, we have produced this year a great deal more than we could sell to advantage, and there has arisen as never before a demand for some system of distribution of this product, which is the first question brought on in this programme. It was brought on first largely because it seemed to me it was one of prime importance, because there are so many things that can be done, and because in this vicinity there is the only successful effort at co-operation with regard to the shipment of fruit and its distribution, and with better results than can be pointed to in any other portion of the state. There have been frequent efforts in this line, notably once at Ann Arbor, and I think at Benton Harbor and St. Joseph, and in a very limited degree it has been attempted in my own county of Allegan, but at no place with the success of the Grand Rapids Fruitgrowers' association, of which we shall hear more when this topic comes up.

I chanced to receive yesterday a letter from a friend in Kansas City, Missouri, throwing some light upon this subject, and you will pardon me if I read an extract from it. He is a gentleman who formerly resided in Allegan, and misses very seriously the delightful supply of fruit in Michigan, and he seems to be longing for "the flesh pots of Egypt," if I may so term it. Having noticed in my paper that we were to hold a meeting here, he said he was minded to write me in this way: "Allegan has been mentioned more than once by Mrs. Lipper and myself this summer, when pricing and buying fruit and celery. Only the rich can afford this luxury here. Reading about your state horticultural meeting, the idea suggested itself, if the peach-growers could combine, get low freight rates, have a responsible agent here to handle their fruit, this ought to be a good market. Fairly good fruit (peaches) sold for \$2 per bushel, and in small quantities at the stalls and stands two for five

cents, twenty-five cents per dozen. Celery never sold for less than five cents per stalk. We did not see one single large, juicy Crawford peach all summer. As secretary of the society, it would be well for you to look into this idea and thus give you another outlet. At present the bulk of your shipments are made to Chicago and Milwaukee. This is a growing city. Thousands of people find employment in the packing-houses and factories." All of which simply goes to show the consuming capacity of that town.

As an illustration of how this may be done, and is done by private individuals to a certain extent, I wish to quote from an article in the Ionia Sentinel of last week, which says that Mr. Luther F. Hall has just returned from central Illinois. Now, neither of these points is so far away but we should be able to establish a good shipping line, and the rates would not be so great as to consume all the profits. "He has returned from central Illinois, where he sold out a carload of elegant Ionia county apples. This is the second car he has disposed of there, and he is busy getting a third car ready for the holiday trade down in that country. Luther says apples are a luxury in Illinois. He sold his car in a college town, and says it all but made him weep to see the way the people recklessly handled and craved that precious fruit, which up to the time it left the car had received such careful treatment. When Luther pitifully protested, and vowed the fruit would never keep through the winter under such a jostling, the people did not even take issue with him, but eagerly came back for more. Mr. Hall said he opened a car of 750 bushels on Friday morning, and by Saturday afternoon he had sold the entire shipment except fifty bushels, in lots of from one to twenty bushels, at from thirty-five to fifty cents per bushel."

These things simply go to show the possibilities of fruitgrowers of Michigan, if they can overcome the obstacles which exist in the way of shipping facilities, and the tendency they have to distrust one another and to refuse to enter into any association or combination for shipment. I think it will be said to you here that there are large numbers of men in this vicinity who selfishly take advantage of the good work that has been done by this shipping association, to sell their fruit by the means it has established, and yet not contribute so much as one dollar toward the expenses of that association. Such things are common among us and they are exceedingly shameful to us. I know that my friend, Mr. Wylie, has had very poor success in my own county of Allegan, with the actions of men who agreed to enter into such an organization and then dropped out of it the moment there was some little selfish incentive offered to them, or they could see a trifling advantage for the time being; and they threw aside the valuable work he and others did, and because for a moment they could make a fraction of a cent on shipments, or something of that kind, they refused to co-operate any further. Whether this can be overcome to any great measure without overcoming human nature is an interesting question, and whoever undertakes it will doubtless find himself a martyr to the cause, will find that he has expended money, labor, and time, as Mr. Graham here has, for the benefit of the public. But they can have the satisfaction that a great many reformers have, that they may have accomplished something, and if there are rewards for such

people beyond this earth they can hope for them there; but they may just as well start in the beginning without any hope of reward here. The man who looks for it on earth will be disappointed; and I think I heard my friend Graham lamenting, the other day, upon precisely this score.

Having received within a day or two a line concerning the quality of the reports of the Michigan State Horticultural society, I wish to speak of the demand that exists for this literature, not only in this state, where it is constantly increasing, but the requests come from localities far from where we suppose there is much horticultural interest; and it comes from all portions of this country, and indeed from other countries, very frequently. It is our purpose to furnish educational institutions, public libraries, and such concerns, so far as we can, with full sets of our Reports. It is impossible, and has been for two years, to furnish a complete set, for those of some years are exhausted, save one or two volumes which we keep in our library at Lansing. I recently had an application from an assistant professor in pomology in Cornell university for a set of our reports. I furnished one to him (of course we do not undertake to pay the transportation charges in any such case) and upon his receipt of it he very politely sent me the following note, under date of November 22: "My Dear Sir: I do not know what I can say to show appreciation of the set of Reports of the Michigan State Horticultural society, which you so very kindly sent me. Everyone who studies from reason scientifically must have these Reports. They will be of great value to me. I appreciate them very much and sincerely thank you for them." I brought this with me today simply because I happened to lately receive it, and I have received many such letters, some of them from German universities that, applying for these Reports, have been furnished them. They have been sent to Australia and VanDieman's Land, where the fame of the Michigan Horticultural society seems to have penetrated. These things certainly afford encouragement to every person who has to do with the work of this society. I think you may fairly state that there is not in this country a horticultural society report that is of more value than our own, unless we shall except that of the state of Massachusetts, which I think produces the most valuable report there is issued. Of course, it is restricted somewhat in its nature, because the horticulture of Massachusetts does not take on a general character, but it is a work as beneficial to the public in general of this country as that of our own state, its matter is of the very highest quality, and its style is such that the state of Michigan can not as yet afford. I secured for the Report for the year 1895, a supply of which is present, a better quality of paper than has ever before been used in the Report in this state. I submitted to the state board of auditors samples of the reports of other states, many of which are very finely printed, those of California, Wisconsin, and Massachusetts especially, and I have secured the use of better paper, which permits the use of a grade of illustration which was impossible under the old system, except by the expensive method of printing special sheets and inserting them in the volume. We hope to secure a Report of larger size next year, but I was restricted this year to a book the same size as that of 1894, because there was a little increase in the cost of the paper. I have got the board of auditors started in the right way, and I hope in the coming year the

coming secretary may be relieved of cramping his volume as I have had to do in the present instance. There are many things which it would have been well to have included in the Report, which, for the reasons I have stated, had to be excluded.

There has not been, in the past year, within my knowledge, any unusual development of diseases of fruit trees. There have been all the evils with us that we have ever had, but there seems to have been less of the insects and no great revival or increase of yellows or black knot or apple scab, nor of the new disease, "little peach," as it is called, which has appeared in Allegan county. There seems to be a disposition to regard this new disease as a northern form of rosette. Without having seen anything of rosette except by illustration, I would be inclined to that opinion, but it does not seem to result quite so quickly in the death of the tree as rosette does in the south; but it does result in the immediate uselessness of the fruit. The fruit in the first season of the disease becomes valueless for the market. You can not even ship it, as some dishonest fruitgrowers do with yellows fruit, because it is not developed in size. I regret that I have to believe that it would be treated in the same way if it were possible. Not all the dishonesty, not all the chicanery and trickery, is confined to the commission merchants nor to any other particular class of people who handle fruit.

There seems to be a disposition among all the commission men of Chicago and Milwaukee, so far as I have talked with them, to decry the packing of Michigan fruits. They say that it has increased in quality very little if at all, and they are constantly met with objections to Michigan fruit as against that of the state of New York, and still more so as against that of Canada, which has been very freely imported this year. The Canadian fruit was better than ours in some respects. That portion which reached the market was better, probably, because the inferior portion was kept at home. They were full-size barrels and were better packed; they were packed for this market as they would have been and were packed for that of Europe, with the result that our fruit, aided by some other conditions which Mr. Morrill will mention, has been at a discount in the Chicago market, and the commission men were praying for the closing of navigation on the lakes that there might be a better state of the market for the fruit nearer home. There has been no closing as yet, unless this severe weather shall have brought it; and if any of you have apples yet to sell, and if you ever pray and have faith in prayer, it would be well for you to supplicate the Almighty to close the straits of Mackinac and boom the apple crop of Michigan, for up to date it has not been a source of profit; and while I say that, there are instances within my knowledge, within my own county, which indicate that all this matter of profit and loss is dependent upon individual effort. I know men who let their apples hang on the trees and drop to the ground and made no effort to dispose of them, although there was a market at some price in my own town for every bushel of fruit that could be brought there. That was not the case at every point in my county by any means; but it was the case in very many places in this state. I know many men who have orchards which paid them because, as soon as an apple could be sold, they began picking and

selling if they did not get more than twenty-five cents per hundred pounds. They marketed their fruit, and the crop was so large that there was profit in it. It was the same in that case as it is in so many other instances, that a man who is thorough and capable makes money, while the man who is not, loses.

There is not anything else, I think, in connection with the immediate business of the society, of which it becomes necessary to speak.

TWO GOOD ADDRESSES.

WELCOME, BY HON. C. W. GARFIELD.

The committee in charge of the arrangements allotted to me the pleasant duty of welcoming this society back to the home of its birth in some words that should seem fitting to the occasion. I greet you with a satisfaction I can but poorly express. A sense of pride in your achievements swells my heart with joy. We cradled this society with the arms of our city, and it grew in strength and favor. Before you could walk with any accuracy or precision, however, you left the scenes of your birth, and your home visits have been few and far between. There has always existed the most cordial feeling between us. We have watched your development from childhood to youth and from youth to mature manhood with love and devotion. We have been proud of your success and influence. You have been aware of this and have known that whenever you have chosen to return to your early home, warm hearts would welcome you. Today, as we extend to you our heartfelt greeting, we are glad to express our satisfaction in your devotion to the cause you so early espoused.

In the quarter of a century since you came into existence our state has made marvelous strides of improvement, and in no department of energy has the advancement been more marked and praiseworthy than in horticulture. You have done your part in this wondrous evolution. In the annals of your history are to be found the names of the brightest minds in our state, who have contributed from their stores of knowledge liberally in aid of your efforts. You have called to your assistance the state university and the agricultural college. You have drawn from all callings and all professions to strengthen your purpose and widen your influence. You have not been parsimonious in your returns. There is not an orchard nor a garden in this state that has not felt your beneficent influence. You have made an impress upon the rural homes of Michigan that will be more apparent with added years.

Not only have your endeavors reached the accessories of life that add beauty and satisfaction to the process of living, but you have not neglected to lift pomology and horticulture into a sphere that commands the attention of delvers in science. Men whose lives are devoted to working out scientific problems have, through their work, been brought to see that in the processes which underlie the most interesting and valuable results of horticultural art there is opportunity for the deepest thoughts and most delicate experiments that require the best ability

and most consummate skill. You have not neglected, in the development of scientific pomology and horticulture, to attract the artist, whose observant eye is ready to catch the delicacy of color and form that appeals to the finer instincts of the human mind. In the development of the wonderful diversity of beautiful forms in leaves and flowers and fruit; in the superlative success along the lines of coloring given to nature's products through the study and application of her laws of combination, the artist has found his sweetest treasures and has been drawn to your art with a feeling of kinship.

Thus, in carrying on the noble work of your society you have aroused the sympathies of art, science, and philanthropy.

While acknowledging and complimenting the worthy efforts of your organization, I can not neglect to utter a warning word concerning the danger I see menacing your way. The figures which are used to exhibit the results of your influence in increasing the valuable products from the soil; the vast quantities of fruit shipped away, the product of your skill; the floral treasures that loosen the purse strings of the affluent; the wealth attracted to our state by the commercial success of horticultural operations, are all seductive in their character. The tendency is strong to draw you from your high vantage ground and subvert your strength and influence to the attainment of mere commercial success. I would not in the least minimize the importance of this organization as contributing to the material interests of the people of the commonwealth, but I would emphasize the larger and more important work of this society in sweetening and ennobling the influences that are thrown about childhood's home; in harnessing art and science as connected with the growth of the loveliest treasures of earth, to draw men and women into closer communion with nature's processes and lift them into a comprehension of the most beautiful things of earth; in giving tuition concerning the adaptation of lovely forms and tints of vegetation and luscious fruits to the building up of dwelling places that shall have a permanence and restfulness that will be so attractive as to develop a race of home-lovers.

The grasping hand which sees first the acquirement of wealth, which would command all human energies in the scramble for property, is insidious in its wily methods of securing the influence of the wisest and best in its behalf. It comes in the guise of benevolence, and with specious arguments draws men away from the most noble purposes.

There are associations, and proper, useful ones, whose sole object is to aid men engaged in horticultural pursuits to utilize their energies and their circumstances in achieving commercial success. This is as it should be. But this noble organization should never be diverted from the full recognition of the breadth of its purposes as outlined in the first article of its constitution.

The influence of your organization that appeals most strongly to our people is that which fosters local organizations interested in the special needs of communities. We have three in our city. The Grand River Valley horticultural society is a direct offspring of the State Horticultural society, and has for over twenty years exerted a remarkable influence upon the amateur horticulture of this county. The Grand Rapids

Fruitgrowers' society is purely a commercial organization and has devoted its energies to the development of a local fruit market that has acquired a national reputation. The Grand Rapids Florists' club is a thrifty society having a double object of bringing the florists into a harmonious business relationship and through its influence to develop in our community a greater love for floral embellishment about the city and suburban homes.

In this connection I wish to remind you that two of the ten charter members of your society were florists, one of whom, Mr. John Suttle, planted with his own hand, under the direction of Hon. Thos. D. Gilbert, the trees that now give character and beauty to our central park area on Fulton street. Perhaps you will bear with me a little longer while I recall to your memory some of the names which were associated with the organization and early efforts of your society.

My memory first suggests the name of Samuel L. Fuller. He signed the first call and was chairman of the first meeting which instituted the movement that culminated in the state organization. He is still living in this city, enjoying the tender care of wife and daughter. He has never lost his interest in our work. I do not forget that it was through his persistent efforts, wise counsel, and material assistance that the breath of life was maintained during the first year of the society's existence. Sluman S. Bailey and L. S. Scranton were the first vice-presidents. The former is with us today, has never allowed his interest in horticulture to flag. Other men have had waves of enthusiasm and have been intermittent in service, but from the inception of the organization to this day Mr. Bailey has the only record of continuous and persistent activity. Mr. Scranton maintained his interest until his death in 1882. Jonathan P. Thompson was the early idol of the society. He was the first president of the incorporated organization, and was afterward secretary until 1876. Enthusiastic, impulsive, generous, public-spirited, he moulded the early trend of the society and laid its foundations broad and deep. Three names of the early days will ever claim the warmest feelings of our hearts: Edward Bradfield, Henry Holt, and George W. Dickinson. They were not only successful fruitgrowers, but their early and regular exhibits at the monthly meetings of the society made the sessions attractive, and their words of counsel were always wise, earnest, and helpful.

The names of Whitney, Ramsdell, Deitrich, Husted, Hathaway, Peck, Ganzhorn, Dyckman, Griggs, Slayton and a host of others were connected with the second year of the society's existence. I would enjoy recounting to you some of the activities of these men as they appeared to me, a mere boy among them. Personally I owe them all a debt of gratitude for shaping and broadening my angle of vision and opening to my view the potent influence of horticulture upon rural life. Their unselfish devotion to the interests of the new organization made a permanent impression upon me that time will not obliterate.

But the noblest Roman of them all, the one man who towered above them all in pomological equipment, in his generous service, and in his molding influence upon the purposes of the society, is our respected, honored, and beloved life president, T. T. Lyon. He of all others, because

of his great ability and continuously active interest in the development of Michigan horticulture for more than sixty years, and his intimate relationship with the movements of the State Horticultural society from the second year of its organization until now, commands our admiring appreciation. To him more than any other one we owe our national reputation and standing as an organization among others of its kind. His name will be perpetuated in the orchards and gardens of the state, and be handed down to those who carry on the work of the society as a synonym for devotion to the best in rural life.

We have been looking with the transit turned toward our beginning. I would for a moment revolve it and let us look into the future of this society. We all have our aims in life, and I feel that this society ought to have a generous and virtuous aim in its future. I feel that we ought not to belittle ourselves by tying ourselves down to any narrowness. Remember that we are not working for an eternal life that is beyond us; we are working for the eternal life that is here and now, and we are a part of it. I have no sympathies whatever with the people who deify the things in this world and are looking for something that is good beyond, to the exclusion of the beautiful things that God gives us here (Applause). It seems to me that it is the mission of this society to call the attention of the people of this state to the wondrously beautiful things that God has given us through the development of our work and the helpfulness of the things that we have about us to lift our whole population to a higher plane of action with horticulture as its leading spirit. It seems to me, ladies and gentlemen of the society, that we have a mission to perform here that no other organization can perform; and now that you have come back to the scenes of your boyhood, come back to the place of your birth, some of you tired and anxious because you have not accomplished all that you had in your ideal, I hope that the welcome which we shall give you will be that which you feel when you get home, after a tired day's work, to your family circle. I trust that through the inspiriting things you will get in this meeting you will go out with a more earnest feeling for the work you have to do, with a spirit to be helpful all along the line and to never give up the work you have undertaken.

We who live here, who have faith in you and had the faith to start you out in your career, will follow you in your work, and we expect to see a rich fruitage. So I say, for the people of Grand Rapids, and I wish I could be more eloquent in it, God speed in your work. We shall follow you and we expect great things of you. In remembrance of the noble men who have molded the efforts of our society in the past, in recognition of the spirits who are now carrying on the good work, and in behalf of the citizens of Grand Rapids, who are proud of the distinction of having given birth to your organization more than a quarter of a century ago, I bid you welcome to the scenes of your childhood. We rejoice in your success, we congratulate you upon your growth and influence, and beg to be counted in every loyal sense as fellows of the society, while we acknowledge ourselves its beneficiaries. (Applause.)

RESPONSE, BY. HON. C. J. MONROE OF SOUTH HAVEN.

I am reminded by the eloquent words of the gentleman who has just addressed you, that last Thursday was Thanksgiving, a day leading all others in reunion of families and friends. It is the special day that the children return to the home of their birth, recalling the past with its pleasures and disappointments, its hopes and despondencies, its successes and failures. It is specially a day of feasting and of good-will, of good-fellowship and of good-cheer. While this is not Thanksgiving, it is a time for thankfulness, for the renewing of old acquaintanceships and friendships, and for the extending of good wishes.

The cordial and hearty welcome given the society on its return to the city of its birth has given us a wondrous home feeling. The retrospection of the last twenty-five years has been so vividly pictured that a flood of recollections has been awakened, and memory brings back the men and women who have been most active in its upbuilding. We recall the many places in different parts of the state where its meetings have been held, with the pleasant greetings, the varied exercises, the music and song, essays, speeches and discussions, all intended for entertainment and instruction. These gatherings have stimulated thought and a desire for knowledge, have scattered valuable and helpful information to those interested in horticultural pursuits; they have increased the planting of trees and vines and flowers, of small fruits and vegetables. More thought has been given to the selection of varieties, their quality and attractiveness; greater care in choice and preparation of the ground, the after-cultivation, trimming, and thinning, the watchfulness of diseases and insect enemies of tree and fruit, the picking and packing and marketing—all more intelligently and thoroughly performed.

Grand Rapids' representative host, in his address of welcome and retrospection, has given us such a large photograph, crowded with so many persons and events, that I can only respond to a few of them. At the front, standing out most prominently in age, service, and the love we bear him, is Ex-President Lyon, who has received such an eloquent and just tribute here tonight—the placing of him at the head in the building up of the horticultural interests of Michigan is suggested and sustained by his voluminous writings and speeches, his services in local, state, and national societies and expositions, his work at the sub-experiment station, his painstaking labor in the revision of the nomenclature of American fruits, his persistent efforts for correct and simple names, and for a high standard of equality. The esteem and confidence with which he is frequently mentioned by eminent pomologists in the United States and Canada, give him more than a national standing and reputation. It is generally recognized that honesty is the best policy in any business or profession. If there are any degrees, we should have the highest type in the propagation of fruits, especially trees, which require years before coming into bearing, and so needing a long time to demonstrate the correctness of their names or quality. Those who know Ex-President Lyon appreciate that there is not money enough in Michigan to obtain his signature to the recommendation of a tree, fruit, or

plant that he does not know to be true to the best of his knowledge and belief, and that, too, of a knowledge and belief founded upon careful personal observation and painstaking investigation and experiment. His name and fame will ever be held in high esteem by this society, and his work and writing better appreciated as better known and understood. It is a great pleasure to have him with us here on this twenty-fifth anniversary of our society which he has honored by giving it some of the best years of his life.

Although left out of the pictures tonight, by the natural modesty of our photographer, the consensus of opinion of the members of this society will place beside Ex-President Lyon the gentleman who for years was so intimately connected with him by official relations. It is seldom that two strong men are joined in work whose thoughts, views, and ways run so nearly parallel, whose tastes and habits are so congenial that a comradeship grows up between them as tender and as loving as that between a father and son. I am sure I echo the sentiments of this society when I remind you that what was said of Mr. Lyon applies in the main equally well to our host. A rehearsing of the good words and works of this society necessarily includes him as one of its chief actors. His services in this society, coupled with those of the local society, have had much to do with the marvelous development of the horticultural interests of the state and of Grand Rapids and vicinity. Recalling the pioneer work, the establishing of local societies widely scattered over the state; the obtaining of reports from them which had to be carefully revised, the correcting of essays, often so deftly done that the writer was encouraged to further effort after seeing how well his production read in print; the extensive correspondence required to encourage and build up these branch societies, urging the sending in of reports on the discussion of the practical work of the orchard, vineyard, or garden; his frequent talks on fruits, flowers, forestry, and kindred topics—and here I wish to digress a moment and specially emphasize the fact that he has ever been ready with voice and pen to protest against the wholesale devastation of Michigan's grandest inheritance, its forests, which have been so wantonly and wickedly destroyed by culling out the most valuable, and leaving the rest in condition to invite wind and fire for its utter annihilation, stripping the country of that which was best calculated to assist in clearing the land, erecting buildings, and making substantial improvements in the locality (how little is left to the state for the ruin of its forests!); in his lectures in other states; his work in farmers' institutes; his writings for newspapers, agricultural and horticultural journals and magazines, with many other duties, taking his time, you have a glimpse of a wonderfully busy life, all of this demonstrating his command over himself and his ability to make the most of his time in turning off a marvelous amount of work. Read his writings and speeches, and the central thought running through it all is an earnest plea for a higher plane of living and a loftier elevation of thinking. I deem it extremely fortunate, on this twenty-fifth anniversary, that we have with us the gentleman who for years occupied the position of secretary of this society and who in such eloquent terms has welcomed us to this city. It is hardly necessary to name him. (Applause.)

There are many others worthy of special mention, who have been liberal contributors of valuable experiences and observations to the society; also, a still larger number not so ready of tongue or pen, whose work and example have been helpful object lessons to the practical horticultural interests of the state.

In conclusion, and on behalf of the many visitors from different parts of this and other states and Canada, and especially of the old members of this society, I most sincerely thank the people of Grand Rapids for the cordial welcome which has been conveyed to us in such appropriate language by our former secretary, Mr. Garfield.

DISTRIBUTION—WHAT BECOMES OF THE FRUIT?

BY MR. E. A. MOSELEY OF GRAND RAPIDS.

Michigan has gained for herself a national reputation through her enormous production of fruit, consisting of peaches, pears, plums, grapes, and apples.

Western Michigan is known as the great peach belt. This section produced more peaches of choice varieties during the past year than any other state in the Union. Having such a large crop to dispose of brings up the question as to how the fruit can be distributed to the best advantage throughout the country and reach the best markets in good condition.

Transportation companies during the past few years have been to great expense, and given much study, experimenting how to carry fruit to destination in best condition. Along this line great advancements and wonderful improvements have been made.

A large proportion of the fruit shipped this season has been in regulation cars. The bushel basket is fast taking preference with shippers and receivers as the most profitable fruit package, especially in the eastern markets, through the middle states, and other markets where thoroughly introduced. Many of the western markets do not take favorably to the bushel basket, especially where they are not familiar with it, often requiring one or more seasons before the trade take kindly to this package. The bushel basket is more profitable for the grower than the small fifth, as it saves a large expense in packing and cost of packages. Another advantage in favor of the bushel basket is its being open for inspection, lessening the opportunity for deceit by putting in poor fruit. The small basket is generally packed in such a manner as to make the fruit appear much better than it really is, and thereby often causing a great deal of dissatisfaction with the purchaser. In fact, the deceit in small packages has become so universal that the trade in many markets are losing confidence in the fruit shipped in this manner and will only buy at greatly reduced prices.

When shipping peaches in bushel baskets in refrigerator cars the fruit will carry in much better condition by shelving the cars, so that each basket will stand level and firm, and one tier deep.

In order to secure the lowest rate of freight to eastern markets and comply with the classification, open, square crates were introduced last season, made especially to fit the bushel basket. In this way peaches were carried without being jammed or pressed.

Until within the past few years peaches were shipped in bushel baskets with slat covers pressed solid over the top, thereby bruising more or less of the fruit in every basket, and in warm weather causing it to rot very quickly.

The very important question arises every year where to find the best markets. The markets of one season can not be depended upon for the following year, as the products of the local fruit-producing sections in different states vary from year to year so that every year markets must be thoroughly investigated in advance of shipping season to ascertain the most valuable outlets.

Right here lies a very vital point with reference to getting fruit to market in proper condition so that it may command the highest prices. Fruit should hang on the trees until it has good color and is properly matured, but not until it begins to soften. Fruit of all kinds, to stand shipment, must be picked when firm and solid. This does not mean that it must be green, but must be matured sufficiently so that it will be ripe, firm, and ready for use on arrival at destination.

In order to place fruit, and especially peaches, before the public in the most attractive condition, shippers should notify receivers in advance, as fully as possible, of the varieties, quality, and condition of the fruit in transit. The receiver can then notify his customers and have his orders ready for the fruit as soon as it arrives. There will then be no delay in reaching the consumer.

When receivers do not know the kind of fruit they have in transit and are obliged to wait for arrival and inspection, it often causes much loss, especially if the fruit should be delayed in getting to open markets.

In order to secure satisfactory returns, fruitgrowers should take more care in getting fruit ready for market. The time is not far distant when poor, inferior fruit of all kinds will not pay freight charges, say nothing about packages and other expenses. With the large acreage at present time planted to all kinds of fruit, it stands every grower in hand to cultivate his fruit, whatever it may be, so as to raise nothing but the best.

When peaches are selected and picked at right maturity, loaded into baskets, crated, and shelved, and under proper refrigeration, they will carry long distances in good order, and should reach destination in nearly as fine condition as when loaded. There is no farming industry that will afford more profit and quicker returns than all kinds of fruit, especially peaches, when selected and delivered at shipping stations in proper condition for distribution.

The geographical location of Michigan gives her access to more states and better markets than any other state in the Union. It is perfectly safe to say that Michigan peaches were sold this year in at least twenty-two states, and in some states having general preference on the markets.

Pears, plums, grapes, and other fruits are sold in adjoining states and near-by markets.

Michigan apples are shipped to markets in thirty or more states and territories, principally throughout the great northwest, western, middle, and southern states. There is always a demand for Michigan apples on account of the numerous varieties, which gives her a great advantage over competing states.

Michigan apple-growers should give more attention to spraying, cultivating, and pruning their trees. Neglect in this respect is seriously hurting the national reputation of the fruit, as Michigan apples for the past two years have not been up to the former standard. On account of neglect in taking proper care of the trees, many apples are under-size, wormy, and do not have the keeping qualities that they otherwise would. Unless special attention is given immediately to better care of apple orchards, serious results will be the outcome. Until recently Michigan apples have been first in rank and in good demand.

While traveling through different states I have often noticed in front of retail stores, where several different varieties were on sale, the sign "Michigan apples" on the barrels or baskets, thus calling special attention to the Michigan fruit. I speak of this to call your attention to the high standing our fruit has in other states and the great importance to all fruitgrowers of raising only the very best. This applies to other fruits as well as apples.

The revenues derived from fruit amount to millions of dollars yearly, and is received mostly from markets outside of Michigan, thus offering a net gain to the state which is of great value.

The fruit industry should not be neglected in any way.

BY MR. C. N. RAPP OF GRAND RAPIDS.

The subject of fruit distribution deserves careful attention. I doubt if there is any subject more important to successful growing and shipping of fruit. Equal distribution is as yet a theory in the handling of fruits, and I doubt if it can ever be obtained. The interests involved are many and conflicting, and it would take time to organize them into good working order, but I think it is possible, and the methods employed are not only increasing in interest, but will be of practical help for fruit-growers to understand and value.

In this discussion I shall treat two phases of the subject. First the distribution of crops, and here the question of overproduction arises. Have we had overproduction for the past two years, or is it underconsumption? On this question there is quite a diversity of opinion, and taking this into consideration, the condition of our country for the past four years (which has had its effect), I believe there has been an overproduction of some kinds of fruit, and that the supply has been in excess of the demand. If this be true, the distribution of crops becomes a very important question, and one that should receive careful attention, and, if possible, be remedied.

The solution of this question seems far distant, for we will have to contend with an element in human nature that is very hard to overcome, and that is selfishness. The central idea of the American people

seems to be every man for himself, in the accumulation of the almighty dollar; and the question of crop distribution, unless it can be made co-operative, would not be a success. The second part of this question that I wish to call your attention to is the markets, how and when to ship. Post yourself on the different markets, their requirements and advantages, select the markets you wish to ship to, and appoint a good representative in each of these markets to represent you. This can be done by correspondence, but a much better way, and the one I would recommend, is to visit each and become personally acquainted with your representatives. Great care should be exercised in the selection of your representatives, and because Mr. A has a high commercial rating and is responsible and reliable, will not justify you in selecting him without first inquiring into his ability and facilities for handling your class of goods. A good commercial rating is commendable, but not necessary. What you want is a firm that is reliable and responsible, and at the same time knows how, where, and when to sell your goods so that they will realize the most money. Most of the dissatisfaction and unjust criticism of commission men arises from this source, and can only be overcome by careful selection and personal acquaintance with your representatives. Too many shippers are guided in their selection by high quotations, flattering letters, and high commercial rating, and so long as shippers continue to use such loose measures they can not expect good results, for it is impossible unless it be by mere accident.

If you have made a wise selection in your representative, he will keep you correctly and thoroughly advised, and I wish to impress upon you right here the importance of having implicit confidence in his advice, and accepting it at all times, and if you do this you will have solved one of the most important points in fruit distribution. Of course, he may err in his judgment occasionally, which is human, but on the whole his advice will be correct.

The importance of the distribution of this luscious fruit, and the methods employed, are not only increasing in interest, but will be of practical help for peachgrowers to understand and value.

It is not more than two years since Michigan peaches were comparatively unknown east of Buffalo, yet during the past season there was hardly a market in any city in the state of New York, in which our peaches were not a part of the fruit handled by the wholesale and retail trade. This superior fruit was also sold quite abundantly in Pennsylvania, and on through the southeast and southwest, all of which proves that Michigan peaches are taking a foremost place among kindred fruits offered in various markets. At first the method of shipping in the bushel basket excited some wonder, but as it was found that these same bushel baskets were "handy to have in the house" (as the proverb of "Mrs. Toodles" says in regard to everything from a piece of string to a coffin), many people bought our fruit to obtain so useful and substantial a receptacle as compared with the frail Jersey and Delaware half-bushel baskets, which can hardly be called baskets at all. Again, there were customers who feared that there was some lack about the fruit put up in such odd receptacles, and when basketmakers gave us bottoms of baskets which were the shape of large inverted funnels, though, in

truth, the baskets might be of the full capacity, there was a lingering doubt of the honesty of the measurement and consequent fears of being cheated. But in the end, many peach dealers have declared in favor of this method of packing.

Beginning after our fruit has been picked from the trees, first sorting, I would advise that there be three grades of the fruit. The first grade alone (which includes fancy and choice fruit) should be sent to far-away markets. There are two reasons for this. First, because it is the only fruit that will maintain the standard of the peach-growing section, and secondly, because it does not pay to ship inferior fruit where the expense of carriage is so great. This grade, if proper care is exercised in handling, avoiding also hot sun and all rough treatment in transit, can safely be shipped to markets which can be reached in four to five days. But in order to do this, the fruit must have proper care, both before and during transit. In the past season we have set our baskets in a crate, thereby obtaining a lower transportation rate, and saving the expense of racking up. Some of our crates were too light and would not stand. This should be looked after, for the loss is not inconsiderable where the crate is not sufficient to hold the fruit securely.

For long-distance shipments obtain a refrigerator car with large ice-box. Ice your car at least six hours before loading, and it will be better to have the car cooled down even longer than that, as the results for the fruit would be enough more satisfactory to pay for the extra trouble and expense. Cars should be re-iced in transit at such points as will keep the ice boxes at least half full. Rock or coarse salt thrown upon the ice seems to improve the condition in extremely hot weather. For long shipments the car should not be filled too full; three hundred bushels should be the outside limit to ship in one car, as the hot sun on the roof of the car is a damage to the fruit. The science of refrigeration has been developed in the past few years so that now fruit can be carried from California to New York in good order. If you are not a carload shipper, it would be necessary for you to join some of your neighbors or else organize an association in order to get the best rates and service.

Promptly on the shipment of fruit to any point, railway companies and all parties interested should be wired the number of the car, so that there need be no unnecessary delay. When the fruit has arrived at its destination, only the door opposite the sun should be opened. If there is plenty of ice used, the fruit will keep in the car at least four or five days, or until sold, but I need scarcely say that the less peaches are handled the better they will maintain their solid and perfect condition.

Second-grade or medium fruit should be shipped to markets near by, where disposition can be made of it. This will be a matter of economy, and can be made profitable if handled rapidly and judiciously. Cullings, or third-class peaches, should not be sent away nor mixed with either of the above grades, for the reason, as I have before stated, that it is important to maintain the standard and reputation of our superior fruit, controlling good markets and commanding the best prices. The style of package to be used depends largely on the market which is to be supplied, as different localities fancy different sizes and kinds.

Some of the large eastern cities prefer the half-bushel packages, such as Jersey peaches are shipped in. To such localities it would be better to ship in half-bushel packages, for it is not the receptacle of the fruit, but the peaches themselves, that we desire to market and prove superior. In small cities the half-bushel basket is not objected to and can, therefore, be used for such points.

And I will here state (though it is outside of our present subject) that another of our fruits, the plum, is better shipped in half-bushel baskets, no matter to what locality shipped. The past two years have absolutely demonstrated the superiority of Michigan peaches, and I firmly believe that the coming year will give us an enlarged market, with demands that will be most flattering and satisfactory.

BY MR. GEORGE W. BARNETT OF CHICAGO.

The title of the subject assigned me presupposes that the fruit has been perfected and is ready for the market. As two other gentlemen have papers under the same heading, and as they are in the fruitgrowing district, I shall assume that the earlier phases of the question will be discussed by them and confine myself to tracing the course of the supplies after reaching this city, which may be considered typical of any large market.

The distribution of the supplies furnished by the fruitgrower, whether direct or through the agency of others, has gradually become a complex and complete system. Perhaps I ought not to use the term "complex", as each step is well defined and, after all, simple, but I think but few fruitgrowers have any idea of how complete it is, and to what distances fruit is exported—the only limit being the cost and ability of the consumer to pay prices commensurate with the necessary expenses and risks.

There are two routes by which consignments of fruits reach this city—rail and lake.

Practically all receipts are taken from the depots or docks to the various places of business as early as practicable after the arrival of the train or steamer. To make the matter clearer, let us illustrate by using letters in place of names.

A, a shipper, consigns to B, his correspondent, a shipment of fruit. On arrival, B has his spring wagons in waiting, and takes it to his place of business on South Water street. There, with other lots of fruit of different grades, qualities, and conditions, it is examined and offered for sale. The largest, finest, and every-way-select lots are taken by the retail grocers whose patronage is among the "upper ten", to whom money is no object, apparently. The grade must be of the very best, quality superior, and condition perfect. Less than five per cent. of the total receipts meet the conditions exacted, so that the amount that can be disposed of to this class of buyers is limited, and their requirements are also about in the same proportion, so it can be readily seen that but little can be expected in the way of fancy prices from that source.

The next grade is of really good quality and good condition, so that it can be handled with a reasonable degree of safety, and good for,

say, twenty-four hours' transit to other points, or to be handled safely by the average retail grocer who supplies the well-to-do classes.

The competition for this class of fruit is the greatest, and often a sale turns on the condition only, the shipper often turning from a good line of fruit and accepting something not so desirable in quality, to secure that which will reach his customers in good condition. It is very much better to have a medium grade of quality in good condition than a fancy line of fruit as to flavor, size, etc., worthless on account of decay.

That fruit which lacks the carrying qualities desired by the shipper is just right for the retail dealer, and as a rule will class good to choice, and is readily taken.

There is then left the inferior, both as to quality and condition. For these, buyers are found among the grocery keepers in the poorer sections of the city—among the foreign populations. They are good judges of fruit, and buy to meet the wants of their customers. With them, also, there are the peddlers, a numerous class and an influential one, whose trade is necessary in handling large receipts. These latter also use the refuse, the “off condition” of all grades, and the poorest qualities that arrive, or that become in poor condition after arrival, as well as a respectable portion of the better grades, for they sometimes carry a very good quality of fruit.

Let us trace these different classes a little further, bearing in mind carefully that there is no arbitrary grading, the perishable qualities of fruit at times making the “fancy” of 5 a. m. “peddlers’ stock” at 5 p. m. Let us suppose C is a retail dealer having the best patronage. He selects what he needs (carefully paying no more than he can help—which remark also applies to all) and no more, has it set aside, and sends his wagon for it as soon as he has completed his purchases. Arriving at his store, it is temptingly displayed to catch the eye, and from his stock he fills his orders, taken often without the price being named in advance, quality being the chief requirement, sends to his customer, and charges it up to his account. The transaction is completed—all but collecting the bill. Many pay; many do not, and during the last thirty years, of all I have known in the strictly fancy trade, less than a dozen have earned a competence. But little net profit remains with them.

The retail dealer, D, who supplied the middle classes, with a fair proportion of the well to do, loads his purchase into his wagon, and at once goes home to be ready for dinner (noon), placing a moderate advance on his purchase price as his selling figure. He sells for cash if he can, or to his “book” customers at practically the same figure.

He delivers to his customer’s home, if desired, but the bulk of it is taken at the time of purchase, and he clears out his stock as closely as possible. The advance charged by the retailer for his labor of selecting, selling, delivering, and collecting his accounts may be roughly estimated at 2 cents per box on small fruits, and 2 cents per basket on peaches and 5 cents per peck on apples. This must cover the loss by decay, sampling, etc., inevitable to the retail trade.

At times, when fruit is scarce, the profit charged will be larger, and when abundant, less. Sometimes a run is made, and a single dealer will

buy 100 to 300 baskets and sell at cost, but I consider this as advertising, not as regular business.

E, the peddler or huckster, buys everything left. It may be "fancy" or "good" out of condition, "scrubs," "trash"—anything is grist for his mill. With equipments worth ten dollars for horse, wagon, and harness of the Greek beginner, up through the various grades to the splendid two-horse team and \$200 wagon (carrying supplies of all kinds and manned by three active, enterprising men) of the successful huckster, the 2,500 members of that great division of distributors are powerful factors.

Taking their purchases into their wagons they at once start for their routes and cry their wares. There can be no fixed margin. They get what they can, take a margin or sell at cost; live on the refuse, and probably they have only a dollar per day on which to support a family. While their transactions on the whole are enormous, their profits are very small, and with long hours, penetrating every street and lane of the city, they earn what they can get. There is not a lane, street, nor avenue of the city where their voice is not heard, not a block but is visited by their ram-shackle old wagon, and their apology for a horse with his harness of straps and strings. Not a house is passed unnoticed, they are everywhere, and sell the fruit at a margin so close that, as I have said, their profits are exceedingly small. I honor them, for they are engaged in an honest calling; I respect them, for they bring to the very poor, in the poorest sections of the city, a taste, at least, of the richest and best offering of the country to the city, and we use them freely in our business and treat them, rough, uncouth, ragged, and ignorant though they may be, as men, and avail ourselves of their assistance.

There remains F, the shipper, whose aid is valuable in the disposition of the receipts from day to day. His selections have been made on the basis of his orders in hand or prospective. He has carefully studied the country that can be reached from this city, and by a course of correspondence or personal interview has built up a clientage that orders from him in such quantities as may be sold profitably.

The entire northwest has been carefully studied, and from central Illinois to middle Missouri, western Iowa, central Minnesota, and all of Wisconsin, orders have been solicited and some have been received. Weekly quotations are sent, some houses sending 2,000 to 3,000 at a single issue. These reach every city, town, village, or hamlet within reasonable rail communication, and everything else is out of the question. He studies the needs of each customer, and having secured the amount needed to fill his orders, at once commences to send by express (and there are no less than 185 of these express trains daily), and to many points where through freights run the fruit goes largely in that manner. It is safe to say that there is no spot within 200 miles of Chicago, with fair means of connection with this market, that can not have a full supply of fruit.

Now, as to the expense or cost of these shipments. The broker, dealer, or shipper, is well satisfied if he can realize ten per cent. on his purchases. Let the shipper of fruit to this market consider what it means. There is the careful selection of fruit, the marking, billing, practi-

cally guaranteeing of safe delivery, chances of failure of his far-off customer—and collecting his bill at the end of two weeks to three months. Applying the test to the fruit broker or shipper, but few get much more than a living out of the business. The express and freight companies charge only a fair compensation for the service performed. Although fruit may come high in central Minnesota or northern Wisconsin, the dwellers in those far-away regions can not reasonably expect to have fruit brought to them without labor and expense, although, judging from some correspondence published at times, one would think so.

From the above, in which I have touched but briefly the course of distribution, I give the agencies used in placing the fruit in position, so that I can easily answer the question, "What becomes of the fruit?" It is eaten.

DISCUSSION.

Mr. M. A. Thayer of Sparta, Wis.: I am interested in the distribution of fruit. I thought when I saw the subject, "What becomes of it," I could tell you something about it; and had I undertaken to have told you I would have taken only one particular kind of fruit, and that is your second and third grades. Now, we in Wisconsin think we know what becomes of your third-grade fruit, because most of the apples that we get are nice on the top, they are nice on the bottom but they are very "un-nice" in the center. We find, when we buy a barrel of apples, we have those nice little barrels, so handy to ship up into Wisconsin; we find when we buy grapes and peaches we get those little baskets for a quarter of a bushel, we get five or six in a bushel. It is very generous in any community to give us so many baskets in a bushel. I am not speaking for the interests of the Michigan fruitgrowers. I am here in the interests of Wisconsin consumers. We want good fruit. We would rather pay you a dollar, we would rather pay you three dollars, for one bushel of good peaches than to get three bushels of poor peaches for one dollar. I speak of this because I wish to emphasize the necessity of fruitgrowers, not only in Michigan but in every state in the Union, giving us a uniform package, giving us a uniform quality throughout the package. I wish there could be a law passed by which every package of fruit that is offered on the market should have placed on that package the name of the grower (applause). Fruitgrowers must learn that the time for putting poor fruit into packages without the name stenciled thereon has gone by. There are some things you must do: you must give better cultivation, you must give better packing, you must give better distribution, or go out of the business. It is out of place to speak of it now, perhaps, but in the growing of fruit you are practically solving the question of distribution. Good fruit will sell itself. Well-grown fruit is half sold before you put it on the market, and I wish we could arrive at some method by which we could grow better fruit and distribute it better. We of Sparta, where we grow small fruit exclusively, have been deeply interested in the question of distribution. We have formed an association and it has worked very nicely. I think there is no other way for a community to manage to their own best interests.

except by thorough organization. It is difficult for you perhaps, to organize so thoroughly, because the smaller growers are suspicious of the larger, but it must be done, in my own judgment, through an association. (Applause.)

Mr. J. N. Stearns of Kalamazoo: I would like to hear just such talk as that from every state outside of Michigan. I think if there is anything we need to learn in this state it is to put our fruit upon the market in just the way of which this gentleman speaks. Now, I will give you just a little bit of my experience. I have had men tell me, who had 20,000 baskets of peaches this year at South Haven, that when they had paid for their help and packages they hadn't a dollar left. Such growers ought not to have a dollar left. (Applause.) Now, I have had experience in shipping to the state of Wisconsin, to several dealers, also to several dealers of Iowa and northern Illinois, this year, and the point of which I wish to speak particularly is that one of those dealers would write me: "Your fruit is nice, but we can't compete with our neighbors who are getting their fruit from South Water-st., so you will have to discontinue." Now, we had three or four such letters as that this season, and I want to say to you that invariably those men came back inside of three days and said, "continue our shipments." Why? They got their supply from South Water-st., where we sold our culls—I will not say culls, but our seconds. We have not sent a bushel of first-class peaches to Chicago this year. Our refuse goes to South Water-st.; all our first-class fruit goes to these dealers. Now, their customers undoubtedly went to them, after discontinuance of our shipments, and having bought this South Water-st. stuff, and they said to them: "I can not furnish you such fruit as I have been furnishing you, without a higher price; that fruit costs me a little more in South Haven than this other does in Chicago, without the transportation across the lake." The answer probably was, "Well, we are ready to pay it, only give us that kind of fruit."

Mr. J. H. Hale of Connecticut: This subject of fruit markets, which has been spoken of by these gentlemen at that end of the line, has always seemed to me an important matter. We have been talking in our horticultural societies, and in the agricultural and horticultural press for years, about the production of fine fruit, and there are a good many men in America today who are experts in the production of fine fruit; but they fall far short of getting the full measure of profit out of their labor because they have not studied the market end of the situation. Now, Mr. Barnett's paper went into the details of fruit handling in Chicago. He tells us that but five per cent. of the total consumers there would take fine, fancy fruit. There is something wrong in Chicago. The fruitgrowers who distribute the fruit in Chicago have not been educating the people in Chicago along the right line, if there are but five per cent. of the people in Chicago who are toned up to buying thoroughly fine fruit. There is something wrong somewhere, and the grower is to blame. You ought to go to Chicago, you who are farmers, and hunt it up, and find why only five per cent. of the people of Chicago buy first-class fruit. Another thing, we complain of the commission man taking too much in commission charges. All right—if they do the work; but when Friend

Barnett tells us that a second middle-man steps in and does all the outside distribution, there is something wrong with the commission man. His business is not so systematized that he can handle your fruit or mine and do some business outside of Chicago. There ought to be some one in his own office who could work up this outside trade. I am surprised that Mr. Barnett frankly confesses to this, that he turns this business over to another man and takes fifty per cent. out of you. There is something wrong in this line, but I am glad he is frank enough to confess it. He is an honest man, but he is not up to the measure of your business or his business. There is another line of thought which came to me, and I like it. Your Michigan friends, in touching upon the distribution of Michigan fruit outside the line of distribution heretofore, spoke so lustily for the Michigan fruit as being better than anything that was grown anywhere else, and one of them got it into twenty-one states; they were proud of it. I was brought up on the Connecticut river and was led to believe that the Connecticut shad was the best thing of the kind that ever grew. I heard it from people who lived along the river, and I believed it until I got out into the world a little and got down to the Potomac and heard those old people in Maryland and Virginia brag about the Potomac river shad—nothing like it in the world!—and the same with the Savannah, and you go up to Maine and it is the same thing with the Penobscot—and they believe it, too—that it was all the very best shad that swam anywhere. I like that thing—loyalty to your own fish which swims in your own river; loyalty to fruit, loyalty to your own; that is right, I believe in that; I like the idea, even if it is a little mistaken, and we are all mistaken a little. It is just that belief—belief in Michigan soil, belief in Michigan men and women, belief in Michigan fruit, all the way through. But put that belief into words, and put it into packages, and put it into the middle of the packages as well as on the top. Now, these men are dealers, and they are talking because there is commission in it, and I want to talk to the growers. Let them simply believe in the fruit and then get it into the package, right plumb through from top to bottom, and then do as our friend Thayer says—get a label on it, stencil it that it is there all right from top to bottom, and then make the Wisconsin fellow pay for it—make him pay like thunder for it, too! And the only way that the fruitgrower can be successful is just by such cheeky chaps as this one coming over here from Wisconsin and telling you how poorly you do business. The man who says he handles 20,000 baskets and does not make a dollar does not deserve to. Learn from these object lessons, and then follow the man that is making some money and find why he is making it. He is making it because he is going into the market either personally or by proxy or both, and studying that line of it, and finding out what people are doing. Now, the first thing to do in order to make any money out of the fruit business is to find where the market is, find what the consumers want, and adopt a scheme that will open their pocket-books and keep them open, but with honesty and good quality. That is what you want. You once get them open and you will keep them open. They like good fruit, they like it well packed, they like it nicely packed, and there is a great deal to tell about marketing fruit. Let us not blame the commission men; let us not blame the railroad man, nor blame the re-

tailer for not getting more for our fruit. Let us come right home. Nearly all the trouble that lies in fruitgrowing and the lack of profitableness can be traced right home to the grower. There is where the trouble lies. Nine times out of ten the man who is unsuccessful is unsuccessful because he works too hard and he thinks too little. You should sometime take up the subject of judicious laziness among fruitgrowers. Work less with your muscles and more with your brains. Plan more and study more from the market end of it. Mortgage your farm and go to Chicago where they handle your fruit, and get your eyes opened. Open your eyes to the market end of the business, and then join hands with the commission man, men like these here and Mr. Barnett, and others, and get them interested in your fruit and how well you are growing it; show them how well you expect to pack it; impress upon their minds that there is real goodness there, and then they will go back and work for you. They will have some spirit for work, but not always, because there is always some uncertainty about what is in the bottom and middle of the package.

Mr. W. W. Rork of Agnew: The fruit business differs very materially from every other business. So far as we have discovered, no man who is in it merely for the money ever succeeds. There is something behind that—love of the business, a love of nature's life and nature's needs, as well as for the money that may be in it. Too many men are in it for the money, and that is the reason for these failures. Sometimes inducements are held out to honest men in honest farming business to shove off into the fruit business for the money that is in it, and they fail every time. Now, as to these packages. It is good to be at both ends of any string. Let the buyers be the packers for a while, if you please, and use the sixth and fifth baskets. If they can put up some kinds of peach alike from top to bottom, they can do what no honest man can do. They are of that size that will not fit those little, insignificant baskets. Fruit was never made to fit them; they are not at all the thing to have, in my judgment, and especially the sixth. It is a "snide", it is a curse anywhere; and you can not put, of peaches of a certain size, more than two or three layers in the fifth, and then it is not more than three quarters full. Buyers do not want the basket in that condition, and you can not put in the next grade. If you fill the basket as full as they demand it over in Wisconsin you must put a smaller layer between or on top or in the bottom. If you put it on top they will not buy it, and if you put it in the bottom they will curse it, and the middle is a very good place for it (laughter).

Mr. L. B. Rice of Port Huron: In regard to Canadian fruit, I wish to present some facts to show you there is something wrong with our fruit, and I want you to understand it, that it is wrong. Our president has alluded to the customs laws between the United States and Canada. I live on the border, I know something about those laws, and I came here to tell you something about them. They are shipping apples from 200 miles within their own territory, and 200 miles into our territory, to Chicago, and they are getting more for their apples at home, and paying twenty per cent. duty on those they send here, according to the invoices, than you are getting here. Our president said these apples were invoiced at forty cents per barrel.

The President: Not today, but they were for a long time.

Mr. Rice: They may have been at this port of entry here, but at our port of entry they never have been, and I have heard that in the whole shipment at our port of entry this year the lowest price per barrel at which they have entered was sixty cents—the invoice price. We find that apples have been shipped from Montreal, and the invoice price of those apples was a dollar per barrel, and those from Brighton \$1.50 per barrel. How are they going to pay thirty cents per barrel for duty and then come into Chicago and compete with you? What is the matter with their apples? (A voice: "Small in the middle.") All the apples that come from Canada, according to our laws, must have the country from which they came stamped on the head of the barrel, so that every barrel of apples that comes from Canada is marked "Canadian-grown apples", by so-and-so, of such a place. So, when Canadian fruit comes into our market it must be tolerably straight or else the buyers go back on the man. I think if we had some such law in regard to our own apples it might help us a little. There is one thing in regard to duties that our people want, and we must have. Canada charges us two cents per quart on every quart of berries we send over there. The United States charges them nothing on what they send here. Our small-fruit growers are completely ruined by the competition, and any man who wishes to start in the fruitgrowing business would better go over to Canada, because thereby he will get more markets.

EDUCATION OF HORTICULTURISTS.

BY PROF. L. R. TAFT OF MICHIGAN AGRICULTURAL COLLEGE.

Many of you have undoubtedly heard of the reply of the celebrated painter, who, when asked with what he mixed his colors, replied, "Brains". There is certainly no calling in which a liberal supply of brains can be used to better advantage than that of horticulture, and if they are as well cultivated as our fields should be, it will greatly increase the chances of success.

Education is generally considered from two standpoints, one being its value as mental discipline and the other as knowledge. During our earlier school-days the former may well have consideration; but, later on, the two can wisely be combined.

In making a selection of the studies that will aid the horticulturist in his chosen calling, we should not forget that he is also a man and a citizen; and that, in addition to his purely technical studies, we should provide others that will aid him in his social and political relations and in those activities that make up the leisure part of life.

For the mental equipment of the horticulturist, no better advice can be given than that we combine practice with science, and if we are able to thus combine the theoretical instruction with the practical it will do much to insure future success. The horticulturist, even more than the farmer, should be equipped with a full stock of knowledge, as he will need it if he is to surround his crops with the conditions that they

require. This knowledge is particularly desirable for him, as most of his crops are grown under unnatural and forced conditions, and they are more likely to be injured by unfavorable climatic and other surroundings than most of the ordinary farm crops. The higher a plant is specialized, and the further along certain lines it departs from the wild type from which it came, the greater will be its value, but the best results can not be secured unless one is familiar with the requirements of the crop in the way of soil, location, food, and care, and has the practical experience that will enable him to provide these in an efficient and economical manner.

Herbert Spencer, in his famous essay on education, says: "The great mass of mankind are employed in the production, preparation, and distribution of commodities, and their efficiency in their labors depends upon the use of methods fitted to the respective natures of these commodities; it depends upon an accurate knowledge of their physical, chemical, or vital properties; that is it depends on science. Scientific culture is necessary that he may understand the why and the how of these things, and processes with which he is concerned as maker or distributor."

By many persons the meaning of the word "science" is not well understood, as it is often used to express contempt or derision. Thus, if a man without any knowledge of the calling engages in farming, it will not be strange if he makes mistakes; but, instead of ascribing his blunders to his ignorance, his neighbors attribute it to his use of science, and sneeringly refer to him as an example of a scientific farmer. Others may have the wildest and most foolish theories, that are contrary to reason and the experience of the merest tyro, and when they are put into practice the resulting failures are ascribed to the use of scientific methods.

The very meaning of the word science, however, shows that this idea is an erroneous one, as, in its strict derivation, and as properly used, it means "knowledge"; or in other words, it tells us why and how certain operations will benefit our crops and certain others will be injurious to them. In the minds of many persons it is impossible to obtain scientific information except by taking a college course or by long-continued close application in the library or laboratory; but, so far as the horticulturist in concerned, this is far from being true.

The work of the horticulturist is to grow plants, and he does this with the hope that some parts (fruit, flower, stem, leaf, or root) will please the eye or tempt the palate. If engaged in the business commercially, the greater will be pecuniary returns, and the higher will be the skill required, if excellence is attained. It can at once be seen that the more information he possesses regarding the crops that he grows, the soil and air by which they are surrounded, and the conditions of moisture and temperature that are most favorable to them, the better will he be able to handle his crops and provide them with congenial surroundings. In order that he may do this, what knowledge must he possess? As he is to deal with plants, he should know the structure of the different parts and the functions that are performed by each. He should understand the nature of the food required by different plants and the various parts of the same plants; the temperature at which they will

develop to the best advantage; the character of soil that is suited to their growth, and the amount of moisture which they need. These and many other points that relate to the growth of plants are included in that one of the natural sciences to which the name botany has been given.

In the early days, botany treated only of the medicinal plants and their properties, and later on it consisted, as studied in the schools, of collecting and pressing plants for an herbarium; but the botany of today is certainly one of the stepping-stones to successful horticulture. It treats of plants of all kinds, and aids us in understanding the nature of those that are injurious as well as those that are beneficial. It will aid us in recognizing the weeds and fungi with which we have to contend, and by informing us regarding their mode of life will enable us to select remedies for their destruction.

Certain trees (and even orchards of single varieties of apple, pear, and plum) have often failed to produce a crop of fruit, but the cause was not ascertained until recently, when it was found that the fruit would not set unless the flowers were fertilized with pollen from some other variety. Planters who are up with the times no longer set large blocks of one variety. If they know why it is undesirable, they certainly have some knowledge of botany. We may very properly claim that anything that relates to the structure or growth of plants is botany, and, although they might "deny the allegation and disagree with the alligator", claiming that they knew nothing about botany, the amount of knowledge that could very well be considered botany, possessed by many of our most successful horticulturists, would be quite surprising, and we can justly claim that it has had much to do in securing their success.

The horticulturist must also have a knowledge of the soil in which his plants are grown, of the character of food that will be furnished by the different kinds, and the physical conditions that, by varying the amount of water and air, will render them most favorable to the growth of the plants. He must also know regarding the various sources of plant food, the amounts required, and the methods of handling and applying them. These and hundreds of other points that are of value to the horticulturist are supplied by chemistry and physics. In these days, when our soils are becoming exhausted and we need to look about us for a supply of plant food to keep up their fertility, every one should be informed of the necessity for and the value of the different kinds of fertilizer. While most of them have a value that approximates to their cost, some are occasionally found that, although sold at a high price, are not worth the cost of applying them. No one can make a rational use of fertilizers until he understands both the requirements of his soil and crops, and the analysis and action of the fertilizer which he uses.

The crops of the horticulturist are attacked at various periods of their growth by innumerable species of insects, some of which begin their attack before the plants are out of the ground, while others keep up the attack throughout the life of the plant, and in some instances it is continued even after the crop is harvested. Against nearly all of them we have remedies that are fairly effective, but, in order that a proper selection may be made, every horticulturist should be informed regarding the habits of at least the more common kinds, and their methods of

taking their food, that he may make a proper choice of an insecticide and apply it profitably. All of this knowledge is offered by the science of entomology.

Several other natural sciences have more or less bearing upon the work of the horticulturist, but the above should suffice to show the value and even the necessity of a knowledge of the sciences, so far at least as they relate to the growth of plants. The question is often asked, "How is it that persons without scientific knowledge are often very successful?" But is the premise correct? Do not these men possess scientific knowledge? One does not have to go to college to study botany, and for my own part I have often been surprised at the array of facts regarding our cultivated plants that have been acquired by persons who never opened a book on botany, nor attended a botanical lecture. They are close observers, and, as most of their life has been spent among plants, they have been able to draw accurate conclusions regarding many points that relate to the growth of plants, even before they came to the notice of the so-called scientist; and, as they have shaped their practices accordingly, it has undoubtedly contributed to their success.

Many growers rely almost entirely, in growing their crops, upon empirical data, which they have acquired either by personal observation or from others, but just as soon as the facts have been established and the laws upon which they depend are understood, it at once becomes science.

There are several objections to relying entirely upon this method of obtaining knowledge, among which the following should be noted: (1) the length of time required to secure the facts, and, as they might vary with the different soils, seasons, and varieties, it might take years to establish them; (2) the chance that all of the conditions were not understood, or the conclusions correctly drawn, and that this might lead to failure when practically applied; (3) inability to adapt one's self to changed or new conditions. On the contrary, it will be possible, in a comparatively short time, by studying the laws that control the various phenomena, and when this knowledge is acquired we shall be prepared to acquaint ourselves with the facts that have been obtained by others. With this as a foundation we shall be able to meet emergencies that may arise, and can surmount them easier than if we grope along blindly and obtain our facts from the slow, hard school of experience.

After writing the above I accidentally ran upon two quotations, regarding the value of chemistry and botany, by two men than whom few have been of greater aid to horticulture, namely, Baron Liebig the chemist, and Prof. Lindley the botanist; and, as showing what they thought of the value of these sciences, allow me to repeat them: "The scientific basis of agriculture embraces a knowledge of all the conditions of vegetable life, of the origin of the elements of plants, and the source from which they derive their nourishment," is the statement of Liebig; and "good agriculture and horticulture are founded upon the laws of vegetable physiology, and no man deserves the name of gardener who does not know the way in which plants breathe, feed, grow, digest, and have their being."

For the young man who expects to follow horticulture in any of its branches, or in fact any other line of agriculture, I would strongly recommend a course at Michigan Agricultural college. I find that the work and value of agricultural colleges are not understood by a majority of the people, and least of all by the class who should be the most deeply interested in them, the farmers themselves. The ideas of their work vary, some thinking that the only instruction given is in handling a hoe or a plow, while on the other hand there are some whose conception of the curriculum is that it consists of a mass of ologies and other trash that are of no earthly use to the farmer.

In the better class of these colleges the instruction covers four years and is intensely practical. While considerable attention is given to the sciences, they are taught in their relation to the growth of the plants and animals with which the farmer is concerned, botany, chemistry, and entomology receiving particular attention. In both horticulture and agriculture, the details of the care required by the different crops are considered at length. In fruit culture each of the fruits is discussed in turn, the instruction covering such topics as the original type, methods by which they have been improved, their propagation and care in the nursery, the soil and location for a permanent plantation, the distance and methods of planting, their cultivation and care, pruning, spraying, gathering, packing, and marketing. In vegetable gardening a similar outline is followed. More or less attention is also given to floriculture, both for the home and for conservatories. The building and care of greenhouses and hotbeds and the growing of the more important crops, including both flowers and vegetables, has attention. The decoration of the grounds about one's home, including grading, laying out walks and drives, locating and arranging groups of trees and shrubs, and the consideration of the characteristics of the different species of plants used for landscape decoration, also receive some time.

Aside from the above, which may be considered technical instruction, every agricultural college gives some time to what may be considered general culture studies. In fact, the curriculum is not unlike the scientific course in other colleges. Mathematics, including algebra, geometry, trigonometry, with practice in field work; a thorough training in the English language, with some acquaintance with its best literature; while physics, anatomy, and physiology, meteorology, veterinary science, history, psychology, political economy, drawing, and other studies all have a place.

It will thus be seen that a graduate from an agricultural college will, in addition to a good general education, possess a technical training that will fit him for any calling along agricultural lines. In many of the colleges considerable attention is paid to practical work in both agriculture and horticulture, that the students may be familiar with the use of the various implements and understand the methods of caring for the different crops.

Many young men do not possess the time and money required for the four-years course, and the colleges in a dozen or more states have arranged to give six-weeks courses during the winter in such special lines as fruit culture, floriculture, dairying, and stock husbandry. In

these courses the instruction will be strictly along practical lines, and will include the sciences that have a bearing upon the general subject. The expenses will be very small, and many young men who expect to follow agriculture or horticulture have arranged to take them. No entrance examination will be required, and the instruction will be such as will require no previous preparation.

Some five years ago the Michigan Agricultural college established for the benefit of the farmers of the state a course of home reading along various lines, such as field crops, livestock husbandry, orchard and garden, domestic economy, and civil government. Any one can read in any or all of the lines, and the only expense will be for the books. The college has mapped out the course of reading, arranged for the purchase of the books at reduced rates, and when the reading of the books of a certain course has been completed, and satisfactory examination papers have been submitted, gives a certificate to that effect. Unless one desires the certificate no examination is required.

The Michigan state experiment station from time to time issues bulletins of interest to horticulturists, which are mailed to anyone desiring them. Not only do they give the results obtained at the Agricultural college and at the sub-station at South Haven, but they are based upon the reports received from nearly one hundred persons who are aiding in the work. The station receives annually hundreds of letters of inquiry upon various topics, and in arranging the work an endeavor is made to carry out experiments in these lines, if necessary, and to include in the bulletins such information as is most generally called for.

The Michigan State Horticultural society holds three or four meetings each year in different parts of the state, and by attending its sessions one can obtain many practical points from our leading gardeners and fruitgrowers that can not fail to be of value. In many counties there are flourishing auxiliary societies that hold frequent meetings, and much good can be obtained by attending them.

The state board of agriculture each year holds a farmers' institute in each county, at which, in addition to topics of general interest, one or more papers are presented that relate to horticulture. Last year a fruit institute, conducted much the same as a college class, and lasting four days, was held at South Haven, and this year there will be a similar one at Shelby. The reports of this society and many of the papers read at farmers' institutes are printed and distributed, thus forming a permanent record for reference.

Among other sources of information that should not be overlooked are various horticultural books and periodicals. Many of the former are somewhat out of date, but each year several are published that have been brought well up to the time of publication. As a rule the writers are well-known specialists, and they have combined in their books their own experience and the facts that they have been able to draw from the experience of others.

In the way of weekly and monthly periodicals, every branch of horticulture has several that are worthy of support. The ideas obtained from them, as compared with those from books, have the advantage of being fresh, and as they keep us informed regarding the methods used by the

leading men in the calling, no one who expects to keep up with the times will be without them.

I have endeavored to point out some of the methods by which the horticulturist can better fit himself for his life work, but while I believe that we should get all the good possible from them, the advantages that we can obtain will be in proportion to our own capacity. No training that can be given will make up for a lack of common-sense, as this is something that can not be acquired. If one has a supply of sound, horse-sense, with which to apply the principles upon which horticulture is based, a sound technical education can not fail to be valuable; but, with rooms to rent in the upper story, a man, even though "college bred," is like a ship without a rudder, and is likely to run upon the rocks.

DISCUSSION.

Mr. J. G. Hancock of Grand Haven: I would like to ask Prof. Taft a question. He spoke of the special course, the six-weeks course. He said the cost was not much. I would like you to give something of an idea of the cost of that special six-weeks course, and when it commences for the present winter; or if there is more than one course.

Prof. Taft: I would say to Mr. Hancock and the others that the college has four courses. They all commence at the same time, on the 4th day of January, and the only expense, aside from board, will be \$2.50, so far as the college is concerned. That is what we call the incidental fee. There is an arrangement under way by which you can obtain board, either near the college or in Lansing, at \$3 per week (board and room, light and fire), and for six weeks it would be \$18. If you board in Lansing, unless you wish to walk back and forth, about three miles each way, it will cost you ten cents per day for street-car fare, but after you reach Lansing this will be the entire cost, except perhaps a small expense for note paper and things of that kind; but no books nor anything of that kind.

Mr. Hale: I certainly am in great sympathy with the work of the agricultural colleges, in their effort to advance the interests of agriculture. I always regretted that in my boyhood days I did not have the opportunities of education, or of a scientific agricultural education. I know that the scientists themselves have been a very great help to me, with what little ability I had to grasp the knowledge they offered. Every line of our scientific work is of aid to the farmer and the fruit-grower, and the man that calls to his aid the opportunities that are given by our experiment stations and by our colleges, and utilizes their work, I am sure, is the one who gets the most enjoyment out of his labor and the most final returns. But there is a thing that has puzzled me, and it is puzzling me now and has for some time. I thought perhaps Prof. Taft let the whole thing out in his most admirable paper, when he said, after telling what they were doing with the boys and the opportunities that the boys had, that they could not help them if there were "rooms to rent in the upper story"; and I have wondered, as a working grower and one obliged to employ a good many men, if it was a fact that all the boys who went to the agricultural colleges were the ones that

had surplus rooms in the upper story, because I have employed quite a number of college graduates and they are not "up to snuff" in fruitgrowing with the average farm boy or with some of the sons of toil. I have within a year or two got some of these short-course students, and I am blest if you don't seem to hammer more into them in the six weeks than you do in four years. I want to get out of Prof. Taft and a lot of other college men, what there is in a college education that helps a man so far along that he ceases to be most useful; and yet I believe thoroughly in it. Do not understand that I am going back on your work; but at the present time I want a superintendent for my Georgia farm, I want a superintendent to take hold of that great peach orchard down there, and I will pay him a good liberal salary, give him a new house to live in, a good horse and carriage, and all free plunder of the farm; but I will finally engage a man that has not graduated from an agricultural college, because I can find one with more horse-sense and more practical, scientific knowledge and capabilities in managing that peach orchard, than I can find anywhere else. The colleges are not to blame for it, but who in the name of the board of trustees is to blame? I do not belittle the agricultural colleges. I do not know how I could run my business without the knowledge they have given me; but what do you do with the boys, that you so thoroughly demoralize them?

Mr. W. W. Rork of Agnew: We are heartily in sympathy with this paper, and we believe that the lack of knowledge is the worm at the root of our whole plan; and it has been grown and ingrown into us that, if you have a bright-eyed, smart boy or girl, lead him somewhere else than to the soil. If he is smart, do not make a farmer of him; and as soon as a boy begins to twist his mustache he thinks he is smart, and he is aiming at something else. Then another idea prevails, that if you are aiming the boy for the farm he does not need to know much—any ignoramus will do for a farmer. People think that any one who can grow rye can run a peach orchard, and run it tip-top; but they know nothing about life. They do not know that vegetation has life, and they do not know that it has conditions. There is no upper room, sir; they live in the basement, and they have no upper rooms.

Mr. R. M. Kellogg of Three Rivers: I can understand pretty well how Mr. Hale's remarks should apply to every other college but an agricultural college. I believe in education, I believe in college education, I believe a man never gets to know too much; but, unfortunately, in most of our literary colleges they do get to know so much that they do not know quite enough to get a living. We are bringing out of our colleges a race of dudes. They are good for nothing on earth. They are a little too proud to work, and they do not know enough to get a living without work. I can understand how Mr. Hale should hunt the country over to find a college man and not get a superintendent for his farm. But if I had a boy and he was here, I would have him educated on the Agricultural college ground. I am not a college-educated man; I am sorry for it, but it was not my fault. It was because I did not get there, and I am suffering in consequence. I have been at our Agricultural college a good deal, and I have studied their workings; and if I had a boy I would send him down there and have him taught to do things and to know how to get a living. Now, I know that a man can not go to

that Agricultural college and spend six weeks without coming home and knowing how to raise better fruit than he is raising now. I know their methods and I know that the institution ought to receive better support in Michigan than we are giving it now, and it ought to enjoy the patronage of every young man in this state.

Prof. Taft: I am sure Mr. Hale's experience is not with the Michigan college boys, but possibly I can account for his own experience in the Nutmeg state by telling a story about a farmer who had two sons. One was a very bright young man and the farmer thought he knew enough to run a farm; at least, he was kept at home to work on the farm. The other one was a half-way fool, and was sent to college—to even things up. While he was away, the farmer had a calf that he was raising, and he was trying to teach him to drink milk. He tried and tried, but it was no success, and finally he wanted to know what in thunder to do with the calf. The boy who was at home quickly remarked, "Father, send him to college along with Bill."

The President: I am one of the poor unfortunates who had to go to growing fruit without an education, and I tell you today that, with my experience, I would give a boy just as good an education, if I expected him to grow fruit in the future, as I would if I expected him to be a lawyer or a doctor. I would make a man of him first, I would broaden him, I would make him believe there was something in him, I would give him confidence in himself and in the world, and that is only gained by the respect for himself which is gained by a good education. I do not care whether you put him in the Agricultural college or any of the technical schools; but broaden him, let him understand that he is a man and a good one; but if he has not good material in him it does not make any difference where you put him—he will not amount to anything. I think a great deal of this criticism that comes on young men is noticed because they are college students; but we have a great many more young men who are practical failures that are not college students than we have among the college students, but we do not notice them. An effort has been made to make something of the young man that goes to college; and if he fails the whole neighborhood notices it, and he is a marked man; but the boy who fails to get that education and goes to the dogs is not noticed, because he has never been noticed and never comes to your notice; and I think this is responsible for the ideas of this character. Mr. Hale has had some experience. He tells us that he would like a capable, clean, bright, college-bred man, who is capable of taking charge of his farm.

Mr. Hale: I want a man that is capable of taking care of it, I do not care where he comes from. If from the college, so much the better.

The President: I will engage to introduce Mr. Hale to a young man, college-bred and a gentleman, before he leaves this hall, whom I believe perfectly competent to do that. If they can get together, I have found his man, and he is a college-bred man, too. I think that this is a matter that is very serious, and I think many of us believe, who have not the opportunity now and did not get it in our youth, that the rising generation needs the benefit of the best that we have in sight in the way of education.

Mr. M. A. Thayer: I have had some experience in the employment of short-course men, and it is my experience that every farm-boy in the country should take a short course. It is a grand thing. But the greatest trouble is, it seems to me slow, so few get the benefit of it. In Wisconsin it is limited to 100 per year, and still that is a fair attendance. I have no doubt it is the same in Michigan and other states. It seems to me it is too slow to reach the masses of people. The education of our farmer boys, in my opinion, must come largely from the newspapers of the country. We need more of them. The fact is, the subscription to our newspapers ought to be increased a hundred per cent. We have agricultural and horticultural papers in this country that should count their subscribers by the million. We have in our farmers' homes too great a scarcity of the newspaper. Now, we all know what the relation of cultivation is to products, in a practical way. I believe that the same relation exists between the newspapers and the home, and there ought to be some way devised by which those papers can be put into the homes of all our farmers.

Mr. J. G. Ramsdell of Traverse City: I will say a word as a friend of the college. I have been intimately acquainted with it and its work since its very foundation. It has not been all that it might have been. It has been singularly blest with the best faculty, or as good a faculty, as a college ever had, from its very foundation to the present time. The board of agriculture, up to recent times, have been extremely conservative, but that was not the worst. The worst was the lamentable ignorance and unreasoning prejudice of such farmers as chanced to be elected to our legislature. Now, there may be some difficulty with the boys, but the great difficulty is in the wide space between the way practical agriculture is carried on and the idea they get at the college. Their ideas are beyond their means when they get home. They have a sort of mania for experimenting, and they are very likely to fail for want of the means; and I fear that if Mr. Hale should take a person because he was well educated at a college, and graduated from the Agricultural college, and place him upon his fruit farm, he would be experimenting on Mr. Hale's money. I think that is one of the difficulties of our college.

Prof. John Craig of Ottawa, Canada: It is sometimes interesting to see ourselves as others see us, and across the border I have an opportunity (as your experiment stations on this side are kind enough to send us copies of all the bulletins issued, and the annual reports) of comparing the work of each, as it appears on paper, at least, and occasionally I have an opportunity of comparing the actual work of the stations, as I have this morning, comparing it with the work of our stations in Canada. There are in my mind four or five stations (I am not in college work, but purely experimental work) in the United States that stand out in bold relief in comparison with all others for doing work which seems to me eminently practical, and work which comes near to and touches the farmer, and which, as one gentleman who spoke said, is the kind that would incite in a student a love for the work; and that, it seems to me, is at the root of the whole matter that Mr. Hale brought up. Now, he may have had experience with

a lot of those boys who were thrust into the college because their parents saw no other place in life for them to go. Perhaps their fathers saw they had not brains enough to make lawyers or doctors, and they were too wild to be put into the city colleges, and so were sent to pasture in the agricultural colleges and turned loose on the world later on. I know something of them. We have in Ontario a sort of pasture ground for a great many English youths who are sent over from London, whose fathers are wealthy and do not know what to do with them; they send them over to our agricultural college in Ontario, and there the authorities try to fill them with learning, and the boys try to fill the place with mischief.

Mr. Hale: Which succeeds best?

Prof. Craig: Well, it is even up; sometimes the boys get ahead. But to return to what I intended to say at the first. It was that there are four or five stations that stand out prominently ahead of all others in the good work, today; and, I may mention without any invidious comparison, Michigan stands not far from the head, if not at the head of this small list which I have made of the whole lot. The work done by the experiment station of Michigan Agricultural college, and particularly that department in which I am interested, the horticultural department, stands well up in the list of all the colleges in the United States. In some cases the character of the work is such that it touches our conditions, and therefore comes nearer to us, and is of a kind which is not only scientific but unites science with practice; and I just wish to say, as an entire outsider and one entirely unbiased, that it seems to me that any farmer who is able and does not give his son an opportunity of a full course, and if not a full course such a short course as Professor Taft has outlined this afternoon, is doing his son an injustice which his son will be inclined to remember in his later days, and for which he himself will probably be sorry sometime during his life.

The President: There is a common practice among politicians of saying, "We point with pride," in their platforms—of opening a platform with that expression, and the Michigan Agricultural college, if they would say anything to you, might say, "We point with pride to the young men we have turned out, who are now occupying prominent positions." They could give you a long list of men who are known the length and breadth of this nation, who a few years ago were mere Michigan farm boys, who are now making their mark in the world, and from whose heads has come information that has yielded millions of dollars to us other fellows who are plodding along. The Michigan Agricultural college has that record, and if you will take pains to investigate it you will find it so.

OBSERVATIONS AND EXPERIENCE IN THE ORCHARDS THE PAST SUMMER.

BY MR. J. J. GEE OF WHITEHALL

When asked if I would prepare a paper for this meeting, I replied that I would if I survived the fruit harvest in which I was then engaged; and, while perhaps it has not been a "survival of the fittest," it certainly has been the survival of one who has had to hustle early and late, with "green" help and ripe fruit, and sometimes over-ripe at that.

You remember Dr. Franklin makes Poor Richard say: "He that by the plow would thrive, himself must either hold or drive." But I am inclined to think, if Poor Richard had been in the fruit business last summer, he would have found it quite necessary to both hold and drive, at least part of the time.

In this paper I desire to give the observations and experiences of a beginner. During the last six years the writer has been buying and planting such varieties of peach, plum, pear, cherry, and apple as seemed most desirable for this climate, having at this time about 7,500 trees, largely of bearing age. As nearly half are peach, I will refer to these first.

The orchard was plowed very early, before blossoming, and, to the writer's surprise, not a tree of any sort, except Elberta, showed any curl-leaf, while other orchards near by, under similar conditions in every way, except later cultivation, were quite badly affected. Part of the orchard was sprayed, both before and after the leaves came out, including the Elbertas, leaving some of this sort unsprayed; but no effect was noticed. The Elbertas curled quite badly, and during a time when the weather was not disturbed by sudden change of temperature, it being warm, growing weather with considerable rain. Some trees of this sort were curled much more than others, and yet conditions were all the same. It came on very suddenly, then gradually disappeared. In an orchard just east of the village of Shelby, of about ten acres, the writer noticed twelve rows across the west side that were badly curled; and, as he had observed before that the varieties in this orchard run the other way, inquiry was made as to the cause. The answer was that the curled trees had received late culture, the others early, and none had been sprayed.

In regard to trimming my trees, I cut back heavily, but made the mistake of not cutting out the center enough. The new growth came out so thick and heavy that the fruit, when shaded too thickly, lacked color; and I am certain that all the fruit would have been larger if more large as well as small branches had been removed.

In regard to thinning, I noticed some sorts required more than others, especially Snow's Orange, Chili, and Barnard; also that one boy with a man will thin more fruit in a given time than three boys with the

same man, especially if they are interested in base ball talk, and that all boys would rather thin peaches in August or September than in June; that they will do better work if paid twice per day than once per month. The heavier and harder the soil, the smaller were the peaches; and the more moisture the soil contained, even where it had been very difficult to make the trees live on account of the damp nature of the soil, the larger the fruit. The peach wants plenty of moisture, at the ripening stage, and this damp soil had it when most needed, in hot August and September weather. I noticed that the peaches hanging near the ground and those on the tips of the longest limbs ripened first; that Jaques Rareripe drops badly if not picked at just the right time; that some pickers can never learn when a peach is fit to pick; that Wager, when well grown, is a beauty under tarletan, and an excellent shipper. That all peaches sold better in the Chicago market in fifth-bushel baskets than in bushel baskets, by twenty-five to fifty per cent.; that a tree that was blown down in early spring and when straightened up had most of the roots broken off, bore the largest fruit of its sort in the orchard and made a fair growth. Query: Why not root-prune by "plowing deep while sluggards sleep" and have large peaches to sell and keep?—which is not exactly according to Poor Richard.

The writer sowed five acres of oats, in August, as advised by Mr. Morrill, and they were a foot high and very thick when the leaves fell, thus holding a fine leaf-mulch all around the tree where needed. We can not afford to lose the cheapest and best of all tree fertilizers, the foliage from the tree, as this contains the very elements necessary to tree growth; and the oat crop, if thick, will hold it.

As to plums, Lombard, as usual, came to the front with a fine crop, but showed up much better on the tree and in the basket than in the pocket-book. Shipper's Pride has proved a delusion to the writer, thus far, the only attractive thing about it being its name. In growing prunes, the writer must have the wrong strain, as the trees hold neither foliage nor fruit, although by spraying I hope to correct this fault. Many of the Prince Engleberts cracked on one side, letting the gum ooze out; this was caused by a heavy, cold wind and storm when fruit was about the size of small peas. All the plums turned black where the wind struck them, and I thought the crop almost ruined. Later, most of them regained their normal color, but Englebert suffered most. Abundance dropped badly as soon as ripe. This sort, like Clapp's Favorite pear, has to be watched closely and picked at just the right time. Burbank is much the better shipper, but both sorts are rather early for the canning trade, for people do not like to put up fruit when the weather is too hot.

In regard to growing the cherry, a mistake was made in not picking off the fruit before grown, from the English Morello, the first three years after planting. This neglect resulted in a very small growth of tree.

In starting a pear orchard, about 500 dwarf Angouleme were set to supply fruit while the standard trees were coming into bearing; but though they are six years old they have never borne five bushels,

while the standards (Bartlett and Clapp Favorite) have had a fine crop. The soil and cultivation are same for each. Who will give an explanation? The Angoulemes blossomed each year, except one, and have other sorts mixed with them that do bear.

The quince orchard failed to blossom, owing, I think, to the slug destroying the foliage the year previous, but by spraying the past summer the trees have held their foliage and I shall expect better results next season.

As to apples, I do not know as they are worth mentioning. After planting and waiting twelve years, I got the first crop, and now do not know what to do with it. For my first shipment, ten crates of fall apples, I received a draft for thirty-one cents. The second shipment, five barrels of choice fruit, gave me just thirty-one cents less than the first. Shall we lay it to "free silver" or to the "gold standard"? We will let the politician decide. However, to a "man up a tree," especially an apple tree, it looks like a case of over-production and under-distribution.

In planting a couple of thousand gooseberries, I made the mistake of setting them in the plum orchard; for I believe that, when plums are set rather closely, they need all the ground, and the berry plants prevent the use of the wheelbarrow bug-catcher.

Since the experience of 1896, the writer is confident that, to make a success of fruitgrowing on a large scale, requires as much tact, energy, and perseverance as do commercial or manufacturing enterprises; for if not well conducted, the orchardist may find himself in the condition of a groceryman in our town who formerly sailed a lumber craft on lake Michigan. I asked him one day which paid the better, sailing or selling groceries. "Well," he said, "when sailing I made a living and a little more; now I make a living and a little less."

BY MR. BENTON GEBHART OF HART.

As I will not be able to meet with you at this time, perhaps you will excuse me and accept my good-will with a few words on new and most profitable varieties of fruits as tested by me the past season.

As regards peaches, a great many were not satisfactory this season. Both new and old varieties were not up to size nor quality. Elberta and Lemon Free stand at the head among new varieties.

In plums, only the large blue and late-ripening varieties were of any value for profit. Burbank, Gueii, Hudson Egg, German Prune, Quackenbos, Black Diamond, and Stanton were all good and gave fair returns.

In apples there were fine specimens of every old standard variety, with many new ones also. Hulbert is one of the best and finest eating apples at this season of year. Its fruit is of size of Wagener, red in color, very crisp and tender. Of several new varieties fruited, Sutton Beauty is a very large and fine red apple, a fine grower, but not so very productive on seven-year trees. McIntosh is the finest in appearance and quality of all fall apples, with me; beautiful dark red and very productive. Wealthy is productive, but ripens and drops its fruit too

early in the season; not wanted for market. Pewaukee is a large, fine apple, and productive, not highly colored. Shackleford bears young but is of poor color and quality. I do not like its style, so far, but Salome and Pyle's Red surpass all others, this season, on young trees, considering productiveness, fine, large, and showy fruit, good keeping: and they hang well on the trees a long time, even in high winds, a most remarkable feature. Pyle is the larger of the two, and most beautiful, of good size, and high color.

Now, a little as to small fruits. In currants, Wilder, Fay, Prince Albert, and Victoria, in the order named, have been most profitable for market, thus far. As to raspberries, very few varieties have again proved to be of any value or a success for market purposes. I permitted my newer varieties to produce too many young plants, which prevented them from bearing much fruit. Loudon Red proves very promising in growth and size and fine color of berry. Marion's Choice and Kenyon are poor growers, and yield small, poor berries so far. I can not recommend them. Miller Red also is very promising, both as to growth of the plant and as a fine market berry. Royal Church crumbles too much, and is a failure for market. Marlboro as yet stands No. 1 for profit with early fruit for market. Among black-caps, Kansas as yet leads all others by far in all points, as a first-class market berry. It is very hardy in cane, fruit extra-large, immensely productive, and fruit handles well on the market. Conrath, growing beside Kansas, blighted somewhat, on both the canes and foliage, is not so fine a grower in cane; and, while less productive, fruit is large and of fine quality. Lotta, I fear, is a failure, and has disappointed me, so far, as a late variety. In blackberries, Western Triumph, Erie, Early King, and Minnewaski have proved good.

DISCUSSION.

Mr. Hale: I noticed what Mr. Gebhart said in relation to Sutton Beauty apple. I am not largely interested in apple-growing; but, interested in fruitgrowing, I have been studying the market apples of America quite closely for a good many years, and it is my deliberate judgment, after considerable study and thought on it, that Sutton Beauty is the best apple that is known in America today. I do not know in how wide a range of territory it will grow successfully. It originated in the town of Sutton, Massachusetts, a good many years ago, and has been grown and marketed in the vicinity of Worcester a good many years. I think it has not been distributed over the country, only within the past ten years, to any extent. The tree is a fine grower, far more hardy than Baldwin, fully as productive; it has a yellow skin covered with red, a clearer and brighter red under the same conditions than Baldwin; much the better keeper, and of incomparably better quality. It is a very fine commercial apple indeed, or family apple. It is an apple well worth considering. I am well pleased with it.

Professor Craig: Will it ship well?

Mr. Hale: Yes, sir; it is a good shipper, a good handler.

A Member: I would like to hear the opinion of the president on Elberta, Kalamazoo, and Chair peaches.

The President: My opinion of Elberta is that we are not quite prepared to judge fully of it, but at present I am impressed with the idea that it is one of the very best things in sight. The past season it has shown up better than anything else through the whole lake shore region, I think. It has fruited with me three years, and I am very favorably impressed with it. I have only one thousand trees of Elberta, but wish I had ten thousand; I would take my chances on them. The buds are peculiar in one respect, in their hardiness; but there is a difference in buds, in hardiness, under different conditions, I have discovered. In a normal condition we can depend upon certain varieties to be hardier than under certain other conditions. In the spring, conditions change entirely, and Elberta appears to be, as a partially developed bud, much hardier than anything else of which I know, and that is a point worth considering in any location where we are likely to have them started by warm weather in the winter. As to its hardiness otherwise, as compared with our Michigan varieties, it is not up with Lewis, Gold Drop, nor Kalamazoo, but it is pretty close to it, and it is much better than Crawford or anything of that class. Kalamazoo is said to be identical with Brunson. If this is true, you may discuss them both together, but I do not know that it is. I know that those who have both say it is.

Mr. Lyon: It can not be, as I have it.

The President: It can not be, as a matter of fact, I think, except that it might be practically identical, because Brunson originated in Benton Harbor, while Kalamazoo originated with Mr. Stearns, in Kalamazoo; consequently they are not identical (there is no question about the origin of the two trees). Kalamazoo is a handsome, medium-size yellow peach with a slight red cheek, a little oblong, of clearest skin, free from blemishes, apparently very hardy, and commences to bear right away; my trees bear right away and show fruit buds in the nursery; my trees that are eight years old have always borne and had to be thinned.

Mr. Hale: What is its season of ripening?

The President: Its season is about ten days after Early Crawford.

Q. How about Chair? The President: I do not know the peach at all, though I have seen it. It is a remarkably fine peach, but as to its qualities I do not know.

Q. How about Fitzgerald? The President: Fitzgerald is a new thing and a man ought not to say too much about it now, but I am probably more favorably impressed with that than anything in sight. It is of Canadian origin. It should be a good thing, as the report on it is that it has proved hardy there. I hope Professor Craig can tell us something of that before we get done with it. With me it has been fruiting two years, commencing on one-year-old trees. They showed up finely last year. At two years old they bore from a few samples to half a bushel to the tree. I have a hundred of those out, I think. They are of size equal to Crawford and they are much more brilliant in color than Crawford. I was talking with Mr. Hale about it today. He seems

to have seen those that were not so brilliant, but in my case they were, and I can not really account for that. I sent some down to the New York state fair and they received very favorable comment there, but I do not think that I have had a chance to see the peach at its best, because my trees are only two years old, and we all know that no peach tree shows what it will do until later than that. As a comparative test of hardiness, last winter we had weather eighteen degrees below zero for a short time, and on one side of my Fitzgeralds stand Lewis trees, which most of you know; on the other side stand Crosby. This spring, before the buds started I counted two hundred buds on each of several varieties. I found on Lewis 15 dead buds, on Crosby 27, on Fitzgerald 2, and I think that was a pretty good showing for a great, big, fine peach, as they appeared to be; and they have a remarkable feature, the smallest pit I ever saw in a first-class peach. Now, if they go on, and do not develop any faults, I think they are a good thing.

Mr. Riehl: I want to say to those gentlemen who were asking about Chair, that we have it in several stations of southern Illinois, and invariably it has done well. It is a fine grower and a good-looking fruit, sends its fruit all over the tree, and all of it in good shape. It has much of the character of Elberta in that respect, and the quality is A No. 1. It is tip-top in quality.

The President: Professor Craig, what do you know of the Fitzgerald peach?

Professor Craig: I think, Mr. President, you have said just about all that I know, actually and personally, of the Fitzgerald peach, and I can go just about as far as you have gone, from personal knowledge. I know that a few growers think very highly of it and are prepared to touch it very strongly, and are planting it very heavily; but it is a new thing, and it has been planted on this side almost as long as it has on the other, with the exception of one or two points where it is doing very well. I think it is one of the most promising of the early peaches, but still I think that it is in the experimental stage. That is just the sum and substance of it.

The President: That is my opinion of it.

Q. What is its time of ripening? The President: It is between Early Crawford and Elberta.

Professor Craig: That is, it comes in when the Early Crawford season is about half over.

The President: I was at a little disadvantage in naming the season, because my trees are only two years old, while my Early Crawfords are seven or eight years old, and, you understand, fully ripen a week or so earlier; my Fitzgerald trees will ripen earlier two years from now than they do now.

Mr. Hale: I think your statement entirely agrees with my experience in my orchard. You said it came between Early Crawford and Elberta, and Mr. Craig said when the Crawford season was about half over. In our orchard, Elberta begins to ripen just about the end of the Crawford season, and Fitzgerald will fit in just about between them. I am growing Fitzgerald, but they are not fruiting; the samples of it which I have had from Canada were very large, of rather

a dull yellow color, inclined to a little bit of woolliness (it did not need shearing, it probably had been clipped on the other side, to save the duty on the wool, but there was a hint of woolliness there which might have been caused by the conditions of the tree from which it came). But the flavor was good, the size was large, the pit was small, but it was lacking in color and style. I think it is a very good peach indeed.

The President: I consider it one of the finest.

Professor Craig: I think, with Mr. Hale, it undoubtedly belongs to the Barnard family.

Mr. Hale: Something of that kind.

Professor Craig: But it has not so much wool as possibly Mr. Hale intimates.

Mr. Hale: It gave me an idea that it was perhaps a first cousin to Hill's Chili, or was of that type of peach which grows well and bears well. We like good-lookers and good-sellers in the market.

The President: I have picked nine or ten varieties, among them Fitzgerald, and it was certainly the most brilliant and cleanest thing I had, unless, so far as the skin was concerned, Elberta might have been the cleanest. What I mean is clean and handsome; there was none of the woolliness. Now, it is possible a change in location might have had that effect. It was new to me, but there was no trace of that woolliness. To me it had one of the finest blooms and was one of the prettiest I ever saw. So far as I was concerned, it was the best thing I ever had.

A Member: I would like to inquire about Triumph and New Prolific.

Mr. Hale: Speaking of New Prolific, I do not know, but it comes from Michigan; but why did you send it out with such an abominable name? That is about enough to kill it on the start.

Mr. Hale: I do not know who is responsible for it, but those things are abominations and might as well be stopped in Michigan as anywhere else. Triumph is a peach which I have seen in Georgia for three or four years past, and in Connecticut for only one year. It is a moderate-growing peach, not the most thrifty, exceedingly hardy in bud; the fruit is of medium and large size, yellow flesh and skin, ripens clear to the pit, and is a clingstone. It has been advertised as a free-stone peach; it is not so by any means, but it does ripen clear to the pit, not like the Alexander or that type of peach which ripen on the outside and are green at the pit. Triumph ripens thoroughly all the way through, and can be eaten clear to the pit, and under certain conditions separates fairly well; but it is a cling. It is of a deep reddish yellow all over; that is, it is a deep yellow, and then splashed with red which goes pretty well over it, somewhat of the Barnard style, if not firmer, but without the woolliness. It is a good keeper and, best of all, it is early; it is an early yellow peach. I am speaking now from a commercial standpoint. It ripens with Alexander or a very few days later, and has size, fairly good appearance, and excellent keeping qualities to commend it. I have faith in it myself and have planted it liberally in Georgia and shall plant it much more this winter, and am planting it in a new orchard in Connecticut. I have not planted any of the early peaches in days gone by. I have not liked anything of the

Alexander or Hale's Early type (and let me say right here, in the presence of this community, so help me Bob, I am not responsible for that Hale's Early peach!), but with the advent of Triumph I am ready to plant early peaches.

A Member: How about Greensboro?

Mr. Hale: Greensboro is another early peach, originating in North Carolina. It is an early one, a little later than Triumph, between Triumph and Early Rivers. It is of medium and large size, a white-flesh peach with red cheek, semi-cling, with a little bit of green at the pit. It is one of the most showy of the early peaches. It is poor; I would not give it to my mother-in-law, as much as I think of her, and still it is a very good-looker.

The President: Is that one of the Chinese type, has it the Chinese mixture in it?

Mr. Hale: I hardly think it has.

A Member: I would like to hear about Foster and Wager.

Mr. Stearns: I know nothing of Wager, and I described Foster some years ago as not being profitable with us on the lake shore. While I am on my feet I will just drop a word of caution in regard to Elberta. It was the finest I grew this year, in appearance, but I have gone carefully on it, as I was disappointed very much in Wheatland and some others of that class, and shall only plant lightly of it until it is fruited more in this state; and this word of caution was in regard to an orchard about a mile from my own. Two years ago this season it bore an immense crop of very fine peaches, so much so that one or two nurserymen went there and budded very heavily from that orchard. A year ago this summer there was not a peach on it, while it was a good peach season. This year, I understand, it had a fair crop. That is the fear I have had in regard to Elberta, that it might not be a reliable bearer, but be something like Wheatland and Foster, on the lake shore. Foster is not reliable with us on the lake shore.

Mr. Hale: I do not wish to intrude nor take time, but I wish to say, with Mr. Stearns, do not attempt to grow Foster in localities where you can not grow the Crawford class. That is right. But do not confuse Elberta with any of that type. It belongs to an entirely different family, a different race of peach. Crawford and Foster, and all those, are of a Persian strain of peach, while Elberta comes from the northern China family, which is entirely different in its habits of growth and habits of bearing. I do not think you need have any general fear of Elberta not bearing enough. It will fill your market so full you will wish there was not so many of them, perhaps. The only doubt I have in my mind about its growing through the northern sections of the country is its lack of color in many places. It becomes a lemon yellow, and the rosy cheek does not come upon it in many sections of our northern tier of states. That is particularly noticeable in Delaware, has been so in some portions of New Jersey, through New York state, Ontario, and with us in Connecticut and Massachusetts. I do not know about it here in Michigan, but that is the one weak point I have seen in Elberta through the northern part of the country; but it will grow enough, it will bear enough, and it will carry well.

Mr. Stearns: So far as that matter is concerned, if plenty of ashes is used, that will be all right. I can add color to nearly any peach by use of plenty of ashes.

The President: I can color a peach by opening out the tree so that it gets sufficient sunlight and then giving it potash. Have you noticed a tendency in Elberta, in the south, to drop very quickly after ripening?

Mr. Hale: I have noticed it with my neighbors; I have never had any trouble with it myself. It is a peach that comes to maturity very quickly, and it must be picked sharply on time; but that is our duty; that is no objection; I think it is a good thing, it spurs a man on to attend to his business right on time; that is no objection, it is one of the advantages.

Mr. Rork: Is not its season of ripening a little against us here? It ripens when there are so many good kinds going to market. Now, so far as we have observed, the good later classes of peach are bringing us better prices than the early ones, and especially those peaches that come right in when there are a good many good varieties in market. I have Elberta, and, so far as I have seen, it ripens when there are plenty of other good peaches in the market. There is a peach that I have not heard mentioned at all, the Garfield. It ripens almost with Early Crawford, but perhaps we will say just after; it is as large, it has better color, it has better quality, and my trees are nine years old; and since they have been able to bear have never failed to bear a good crop, and generally have to be thinned. Elberta comes soon after it, very soon, and I am a little doubtful about its desirability in my case. Then you speak of Chair. With us it is about the best peach of the season. The only thing we are not settled about is whether it is hardy enough, but it is hardier than Crawford. It is a good bearer, bears heavily, is a good tree, and ripens at just about the right time.

The President: Answering Mr. Rork, I should say that the time of ripening of Elberta is against the other kind, because when Elberta comes it takes the market here.

Mr. Richardson: I would like to enquire if Wheatland is considered a strictly freestone peach?

The President: Not in 1896. It was before that.

Mr. Richardson: Well, it is generally admitted to be, is it not, in a general way?

The President: I presume that nearly every peach-grower here understands that we had peculiar conditions in 1896. Many of our free-stone varieties, known freestones, or former freestones, that you could throw a pit right out of, were everywhere clings. Wheatland clung very badly, and many other kinds were semi-cling that I had never seen cling before. They were fully developed, yet very many of our genuine freestones were semi-clings.

Mr. Richardson: I noticed on our market Wheatlands looked very beautiful, were of fine color; and I spoke to one of our buyers, saying, "There are some very fine peaches for you this morning." He said, "I don't want them—they are clingstones." I said, "I was not aware that Wheatland was considered a clingstone," but he was preju-

diced against it. I have it in my orchard, and not bearing yet, and that is why I wished to enquire.

The President: I would tear it out before it got to bearing, and get something good in there.

Professor Craig: A man asked about Wager. I would say that Wager is gaining favor in Ontario, where it is well cultivated. It last year was one of the most profitable of the best peaches; it was ranked among the medium hardy kinds. Elberta colors up well in Ontario where it has been fruited. It has been fruited just in the best of the fruitgrowing sections, and it is thought of highly. Now, to go back to apples. Somebody mentioned McIntosh, and I just want to bring this apple to your attention, for this reason: I think, if you wish to cultivate a high-class, handsome apple of good quality, for your No. 1 Chicago trade, and care to take the trouble to spray as you should, that McIntosh is an apple that would capture the market at the season it was put on. It is most beautiful, covered with purplish blue bloom, is of the Fameuse type, and of good quality. It originated on the banks of the St. Lawrence. The tree is perfectly hardy and it would work well up in your northern apple-growing sections here, and I would mention it with the caution that you need not expect to grow it in good quality without spraying.

Q. What is its time of ripening? A. The Fameuse season.

Mr. Ramsdell: Have you had any experience with Crosby?

The President: I have had some of the same age as my Fitzgerald. They grew very nicely this year, a fair-size peach, and growth of trees the same as Barnard, and the leaf looks like it. I think that is as close a description as I can give—that Crosby is of the Barnard type, similar to Barnard in color, growth of tree, and form of leaf. That is right, is it not, Mr. Hale?

Mr. Hale: The flesh is not so red as that of Barnard.

The President: Mine were colored nearly as much as Barnard.

Mr. Hale: In the east it is yellow all over, with a stripe of red on the sunny side. As it is ordinarily grown it is inclined to be medium to small.

Prof. Taft: I would say that on trees that came from Mr. Hale it was of the highest color of any peach that I saw. One entire side of the peach was blood-red, with just a nice bloom; a good-size peach, a good, fair-size peach, as large as what we call, perhaps, a small Crawford.

The President: That would answer the description of mine. One side would be a solid blush and the other side would have mottlings of red, very beautiful, and they were grown on young trees—they were genuine trees, some that came from Mr. Hale.

Q. How is it as to hardiness?

The President: Those who have had more experience should speak as to that. I made a comprehensive statement, a moment ago, in regard to its hardiness, the only thing with which I have had a chance to test it. Professor Taft can tell us of its hardiness. He has known it before it was named Crosby.

Prof. Taft: I think it about as hardy as Lewis, not quite, perhaps; still, it should be counted in the same class.

Mr. Braman: I would like to ask the color of Chair.

Mr. Riehl: It is a fine yellow peach with a good bloom upon it.

The President: Has it any characteristics that correspond to other known varieties?

Mr. Riehl: It does not belong to the Crawford type at all.

The President: Does it belong to the Smock type? Mr. Riehl: It is a much better peach than Smock.

The President: Is it of that kind of growth—oblong? Mr. Riehl: Yes, it is rather an oblong, large peach, and the fruit is spread all over the tree. In this respect, as I said before, it is much like Elberta. It is of uniform, nice color, a large peach.

The President: A reliable bearer? Mr. Riehl: Yes, sir.

The President: When does it ripen? Mr. Riehl: It ripens, with us, in September.

The President: Comparatively, please? Mr. Riehl: It will ripen about two weeks ahead of Smock.

The President: How long behind Elberta? Mr. Riehl: Well, I should say about a couple of weeks after.

Mr. Rork: With us, on the shore, there is not a handsomer peach in form or color, nor one of better size. It ripens just out of reach of Smock.

The President: With Gold Drop, then? Mr. Rork: Yes, sir.

Mr. Braman: Chair, with me, is about the time of Chili, and it is a bright-red peach, nearly as handsome in color.

The President: We all understand that, in Michigan, and I presume in other states, there is great difficulty in knowing just exactly what you have. Now, I never saw that better illustrated than at the Michigan state fair two years ago. Four distinct types of Elberta were on the table, and no two of them were ever propagated from the same stock, but had been sold for Elberta. Each man, when he came there, supposed he had the genuine; and one man was wondering what all those Elbertas were doing there when his were ripe and gone a month ago, and he had the finest crop he ever saw. That illustrates that it is very difficult for a man who is not well informed to know whether he has pure stock. Substitution is very common, and often our ideas are at fault owing to that, and sometimes that accounts for quite a difference of opinion.

Mr. Braman: Those trees were from N. G. Hilton. He has been raising trees a number of years. They began bearing when they were three years old. He has been cultivating them and selling them through the state; and whether they are of the same variety as the gentlemen have been describing, I could not say, but he has been selling them as Chair the last few years.

Mr. Hamilton: It would appear to me that Mr. Braman's trees are not Chair. Wherever I have seen it, this peach has ripened some time after Chili, right with Smock, later than Gold Drop. I would call it a later peach than Gold Drop. If persons who speak of peaches would tell of the glands it would help much. I would like to ask Mr. Braman if he noticed the glands on those trees?

Mr. Braman: They are a good deal like those of Early Crawford.

The President: Are they globose, or reniform? Mr. Braman: Globose.

Mr. Hamilton: Then that would settle the question. Chair has reniform glands. Mr. Rork thinks they have the reniform, and I am quite sure they have.

Mr. Hale: It is a peach much of the form of Smock, with a very rosy cheek, and rather an acid fruit—rather a sharp, high-flavored peach. Perhaps that will help you out a little.

A Member: I would like to ask about Captain Ede, because it has been recommended as a substitute for Elberta on account of its freedom from leaf-curl?

Mr. Hamilton: With regard to Captain Ede, I grew a few trees a number of years ago and sold them. I got my buds from George Endicott of Illinois, who thought they were very fine, and sent me the buds because I happened to be a friend of his. I had full faith in the peach, and set it out; but it curled so badly that the great proportion of all the trees that I grew in western Allegan county are now dead from curl. It is a very fine peach, I think equal to Elberta, and resembles it very closely; but any one who would discard Elberta for Captain Ede, because of curl, would be thoroughly mistaken; they are both bad curlers, but Captain Ede is very much the worse. It curls so badly that I think it would be scarcely worth while to try to grow it close to the shore. Back from the lake so far as this, where they have warmer summers, they might succeed with it, but wherever they can succeed with Captain Ede I am sure they can succeed with Elberta, and I prefer Elberta.

Professor Craig: I would like to ask what the concensus of opinion is about Reeves, at the present time, in Michigan?

Mr. Stearns: They are growing it about South Haven and are highly pleased with it, and there is quite a good deal of call for the trees this season.

Q. Does it bear well? A. It has the last two or three years. I think that is one reason why it has not been more plentiful before, that we have had exceptionally good seasons the last three years for tender varieties.

Q. Tender in bud, is it not? A. Yes, sir, I am inclined to think so.

Q. Does it ship well? A. It is said to; I have never shipped it myself, but I have had several calls for the trees because they have thought so much of it around South Haven.

The President: It is a large, heavy peach, delicate in texture, very tender in the bud.

Mr. Stevens: It is very tender after ripening.

Mr. Richardson: I would say that it comes right between Early and Late Crawford, with me, if I have Reeves. Now, I set trees that I call Reeves, and they resemble Late Crawford but are a larger peach. They color up a little differently, are not quite so oblong, are more rounding, and are larger. They did not bear very early with me. I supposed they were Late Crawfords because they hung off so about

commencing to fruit; but after beginning they fruited right along heavily.

Mr. Hale: Reeves is too shy a bearer to be profitable the country over. It is a very large, round peach, of high color, very delicate as a shipper, only suitable for near-by local markets, and too uncertain a bearer for anybody to dare to plant when there are so many other profitable varieties. I should never plant it anywhere, nor advise anyone to plant it; but if you want a few baskets of very showy peaches, to brag over, why, perhaps you will find them suitable, if you have an orchard large enough, for it is shy.

The President: That is my observation.

Mr. Stevens: If I have Reeves I can not agree entirely with Mr. Hale. Those I had were grown on three-year-old trees; that is, three years old last spring. They bore quite heavily for their age, this year, but they were very delicate and did not color very well; but the foliage was very heavy, and they were so exceedingly delicate that I had to pick them very green in order to get them into the market at all.

Mr. Rork: How about Reed's Early Golden?

Mr. Braman: I would like to say a word in regard to Reeves. I set the trees nine years ago last spring; they began bearing at five. The first year they were not very highly colored, but have borne every year since and given a very high color. They are yellow, with a bright red, ripen just past Early Crawford, and are a very good peach. I have examined them nearly every year, and it seemed as though the buds were killed, and still there would be enough for a good heavy crop each year, and there were no culls; they did not require thinning, and were equal in color to Crawford, but in shape a trifle longer.

The President: I have a call for Reed's Early Golden. Mr. Rork, what do you know about it, what starts you to asking questions about that?

Mr. Rork: Because I have some trees. They ripen just after Early Crawford, and I was in a little doubt as to their productiveness and their hardiness.

The President: Where do they come from and where are they grown?

Mr. Rork: They came from New Jersey.

Mr. Lyon: It has only been tried about a couple of years, on the station ground, and my recollection about it, as compared with others, is not quite distinct enough. But my impressions are favorable for it as a medium variety. It will range, perhaps, with Barnard in quality, but not at all like it in productiveness; but as to that I would not feel at liberty to speak confidently at all.

Mr. Whitmeyer: Is there any difference between New Prolific and Kalamazoo? The reason I ask is that it was stated several times recently that they are identical. Mr. Stearns perhaps can answer that.

Mr. Stearns: I have never seen what is called New Prolific, but was told by a gentleman, I think Mr. Graham, that New Prolific, Brunson, and Kalamazoo were all on exhibition here at Grand Rapids, a year ago this fall, and but very little difference could be discerned in the three sorts.

The President: That was true, at the state fair.

Mr. Stearns: But I know nothing of New Prolific. I would say that I had a thousand bushels of Kalamazoo this year and a thousand bushels last year.

Prof. Taft: I think we have had no fruit yet from New Prolific, but we have had the trees and they greatly resemble Kalamazoo and Brunson, and I saw the peaches last year, here at the fair, and I think two or three times have received samples of them from fruit-growers. They seem to be a very promising peach and look exactly like Kalamazoo.

Mr. Gee: I have heard the statement that Brunson and Kalamazoo were identical. Brunson curls quite badly.

Mr. Stearns: Kalamazoo is very subject to curl, but not any more so than Crawford and Foster, not so much as the Crawfords.

Mr. Lyon: I received samples of New Prolific from Greening Brothers, which were very much more highly colored than I have ever seen. I can hardly think they would range alike in that respect, under any ordinary circumstances. I would not be inclined to suppose they could be identical.

Mr. Graham: In relation to New Prolific, a year ago this fall Greening Brothers exhibited them in quite large quantities at the state fair, had several bushels there, and they were placed side by side with Brunson and Kalamazoo, and I declare I could not tell them apart, and I called the attention of a great many growers to the three varieties. I do not believe any one could tell the fruit apart. I never compared the trees one with the other.

The President: I will say if it is as good as Kalamazoo it is an excellent peach.

Mr. Pearce: There is one thing of which you should not lose sight in this discussion of the different varieties of peach. There are climate, situation, and soil, perhaps, to consider. Now to illustrate: Late Crawford, with a few winters a little bit too cold, would not be worth anything, while with the right kind of winters it is one of our best, most valuable, and profitable peaches. It also has to have a very good location. Wager, in a very dry time, is not worth anything at all; it does not stand drouth, while it is a tolerably fair peach for the right kind of season. It is the same with Barnard and others. For certain years and a certain kind of season they are all right, but with different conditions they are not worth anything. For a number of years, Barnard was one of the very best, but of late Reeves is a very great favorite here in Grand Rapids, coming between Early and Late Crawford. It is a very fine peach, thought a great deal of. Peaches require certain qualities and conditions. If you strike the right season and the right location, they are all right, but under some conditions nearly every sort is almost worthless.

Mr. Hale: That is a very admirable thought. He says location and season. Now, I wish he had gone just a little further and said soil. When we criticise the Crawford type of peach as being untrustworthy, we speak of them as they behave on a sandy loam soil, where we grow

most of our peaches the country over. The Crawford types thrive best on a pretty stiff clay soil, if it is well drained and other conditions are right for peaches. Now, possibly the soil in the vicinity of this city is different. Perhaps there is a little more clay than there is in your greater peach region down along the lake, and certain it is that while climatic conditions and certain seasons may affect one type of peach and not another, it is also true with different soils, and that the Crawford peaches, or peaches of that class, will fail on sandy soils and sandy loams when they will thrive on quite heavy sub-clay. All these things must be taken into account when we are giving our testimony as to how they behave with us.

Prof. Craig: I had in mind Reeves on sub-clay, just such as Mr. Hale mentioned, when I asked that question, and it was the magnificent showing that this orchard made last season that particularly impressed me with the value of that variety, when traveling through the peach districts of Ontario. I was in a number of places, and perhaps the fruitfulness was produced by the trees being on clay.

The President: Was it on land that had had hardwood timber?

Prof. Craig: Yes, sir. The trees were all over ten years old and were all well laden with peaches, considering this as a peach year in Ontario when such varieties as Crawfords did not produce more than a fifth of a crop. But Reeves, I learn, does not come into bearing early, but after five or six, or seven, years at the outside, it is a pretty regular annual bearer; and when people get to know the quality of the fruit, and where growers take the trouble to get the fruit into the market in good condition, they have in every case found it a very profitable variety.

The President: That is an excellent thought to bring out, and something about which the prospective fruitgrower should know something. It is noticeable in the southern part of the state, and I presume here, that lands that are of clay and gravel, that formerly grew white oak timber, seem to grow the Crawford variety of peach better than any other soil we have, while many of our white varieties do well in drifting sand where the Crawfords are an absolute failure. Those are things which it is best for you, if you are contemplating setting, to look up. You have your soil, you know what it is, and you would better get a little experience from other people, if you haven't it yourself, as to the varieties that will succeed on that particular soil. There is quite a range of difference.

Mr. Whitmeyer: I find our Crawford peaches on clay soil, and some other peaches of that type, have so much foliage that they cannot receive the light; the foliage is so large that the fruit does not get the light and color up.

The President: Is it hardwood timber or oak?

Mr. Whitmeyer: Oak timber, and they do not color, and I set that orchard of fifteen acres thirty feet apart. In the center of the square I have a pear, so the distance does not hurt them. Right on the other side I have another orchard, some Crawfords that are only fifteen feet

apart, and they color apparently just as well as those on these other trees, but the foliage on the other was eight to ten inches long.

The President: That is a good place to get some peaches by and by; that orchard is all right if it will do that.

SOME FLORISTS' PROBLEMS.

BY THOMAS GUNSON, MICHIGAN AGRICULTURAL COLLEGE.

The business of growing flowers in glass houses, for commercial purposes, as at present understood, is purely an American invention. There is scarcely a single idea in all the annals of horticulture that bear directly on the work of today. Everything is new. We may imitate each other, but all the recent ideas belong to this generation.

A business so young, so advanced, and so largely dependent on the esthetic taste of the people has reached its present conditions in a very peculiar way. Its development belongs to no particular class, but men and women of all nationalities have vied with each other in giving their best thought and care in bringing it up to what are known as ordinary methods.

The problems of the florist are many and varied, and though he may try to avoid the snares and pitfalls of experience, new difficulties beset him almost every day. It may be what seems now a universal problem with every product of the soil, overproduction at one time and scarcity at another; it may be that some one has found a better way to produce or preserve; or that some one may have studied fickle fashion more closely, and got hold of some color better suiting her unstable taste; or it may be that the girl in the store is not up to date; lack of attention in the greenhouses, any one of which is enough to turn the business one way or the other. The florist has, like all others, suffered from the long and severe depression, and yet he has suffered less, perhaps, than those engaged in more necessary labor. The product of his labor is a luxury, and people have been struggling to get the necessities.

That our friends the fruitgrowers may better understand the difficulties that beset the commercial florist, it may be necessary for me to enumerate the principal crops that constitute what are known as florists' flowers. These consist principally of roses, carnations, chrysanthemums, and others of more or less importance. So different are they in temperament that when grown together for any length of time they gradually dwindle and die. Each requires a specialist ready to cater to its whims, and if their wants are not granted there are from one to half a dozen diseases ready to carry them off at any time.

With the fruitgrower it is different. Nearly all the principal fruits belong to the same order, and though they may belong to different genera there is a distinct relationship between them. All are natives of the same temperate zone, and have by long cultivation become so thoroughly

acclimated to conditions that they can, in many cases, be all grown in the same field without one being detrimental to the other.

The florist has to imitate a climate that varies with its vegetations, extending from the tops of the Himalayas and the Andes to the surface of the sea; and with a flora whose home varies from the cold, rugged coasts of Labrador to the reeking swamps of the dark continent; and when all care and attention has been given them, a few days of adverse weather at a critical time may render his roses deficient in color, lacking in length of stem; may cause his carnations to burst their calyxes; his chrysanthemums to lose their symmetry or lessen their vitality; it may even rob the violet of its fragrance, or the lily of its purity, and all this beyond human control.

I can not believe there have been more flowers grown than are needed, but that there have been enough and to spare can not be denied. How best to control the possibilities of occasional gluts without injury to the growing plants; how to get the quality and the quantity on the least possible space and in the shortest time, with the smallest amount of labor, is what every grower is asking himself.

In order to meet the gradual decline in prices it is plain that the florist must seek to reduce the probability of a glut, either by growing a better article or lessening the cost of production.

The rose is by all odds the most expensive flower to grow, and the season at which it can be grown the cheapest is just the one wherein the chrysanthemum reigns supreme. The season for this is likely to be extended, and as soon as it is over the public seek a cheaper flower with better keeping qualities than the rose. The price, however, of all other flowers is graded upon that of roses, and the price at which the variety known as American Beauty can be had regulates that of all the rest. The size of its flower, its enormous length of stem, draw so severely on the plants that few are produced for the space it requires. The average florist has made less money trying to grow it for his limited demand, even at fabulous prices, than that of any other variety. Every effort is being constantly made to find some variety that will satisfy the taste that American Beauty has created; something that will produce more flowers, and yet possess some qualities that this queen has so far been able to call her own. It is no small item of the florist's expense, this seeking for something new, as the many varieties that have been tried and found wanting abundantly prove. The varieties Mrs. Pierpont Morgan, Meteor, Kaiserin, Bridesmaid, Testout, and Belle Siebrecht are promising kinds in that they possess a wider range of color and have a tendency to produce more flowers. Belle Siebrecht, however, has not been in cultivation long enough to tell whether it has come to stay or not; and while Meteor has established a reputation for its color and constitution, it is still a very expensive variety to grow. It requires a higher temperature than any other, and this of itself is a serious objection.

Now, whether it is better to grow roses in solid beds for one, two, three, or even four years, than to grow them on benches for one year, is still a question. While the latter method is the one generally adopted, good growers have long felt that, owing to their being propagated by cuttings

year after year, and kept growing all the time, the plants were gradually becoming weaker; that in order to maintain their vitality they need a distinct period of rest. This is a natural inference, especially with plants like the rose, that are natives of temperate climates. Now that quality rather than quantity is preferred, and flowers of a different type, this question of solid beds or benches becomes one of more than ordinary importance.

I know that good rose-growers have time and again tried this process of resting, when they had extra strong plants of some standard kinds, that they felt like trying another year, rather than replanting with young plants, perhaps late in the summer, but it has seldom if ever paid. The object, however, has been one of experiment rather than any well-defined attempt at restoring vitality.

A trial for a single year on a raised bench can not be so efficient as one for a series of years on solid beds. There is a great deal more to the resting of plants than simply withholding water. Drying out can scarcely be called resting. It is highly probable that in most cases, if not in all, much of this kind of resting is more apparent than real, and that a good deal of secret and subtle work, of which we know little or nothing, needs be done before the plants can regain their energy. Plants show this when their resting period is curtailed or unduly interfered with.

We have no facilities at the college for making any extensive observations along this line, but I may say that our experience with violets every year leads me to think there is something in it. No treatment we can give them in the greenhouse will give the returns they will make in a cold-frame in the spring, if kept from severe frosts in the winter. It is true their period of flowering is greatly shortened, but I don't believe it is any more natural for the violet to flower six months in the year than it is for the apple or the cherry. I have thought that if violet-growers who have only a limited demand would build their houses in sections, or partitioned so that rest could be given the plants at different periods, natural conditions could be more closely imitated, disease better held in check, the flowers would be larger, better in fragrance and color, and more numerous. It might give the grower better control of the market by his having the largest crop of flowers when prices were highest. It would lessen the cost of production by giving as many flowers, though in a much less time, so that the houses could be used for some other purpose if needs be. When grown in large quantities the houses could be constructed entirely independent of each other, so that the same control could be had over the plants as in case of the one built in sections. I speak of the violet simply because it is the only flower I have had the opportunity to observe in this respect.

There are two or three things that suggest themselves to me in connection with this subject of growing and resting plants that may bear indirectly on this subject. I am not aware that botanists or pomologists have ever given any satisfactory reason why certain varieties of peach or pear, for instance, come into bearing condition sooner than others. What physiological changes take place within the plant itself in order to bring

about an early fruiting condition; and, as the flower precedes the fruit, is there not something further here that we should learn?

The order to which the rose, apple, pear, plum, and cherry belong is one of the highest in the order of development among plants. Does not this development mean the changing of an annual to biennial, and from a biennial to a perennial? An annual produces a great many more flowers and seeds than either a biennial or perennial, and as the rose strictly belongs to the latter class, it can't be expected that it will do so well under the ordinary methods of treatment. It is scarcely enough to say that some are early and some are late, some more tender than others—properties they may have inherited, or that may have been brought about by selection, cultivation, and in various other ways.

This variability and lack of productiveness must be due to some physical condition within the plants themselves. Some plants must have the power of producing certain elements necessary to reproduction sooner than others. One thing may be said to be true, that nature hastens reproduction in proportion as life is endangered. If this is as true of plants as it is of animals, it is to our interest to know at what period of their existence the plants grown for flowers have the greatest tendency to reproduce, and what elements can be supplied, if any, to bring it about, for this is simply what flowering means.

The business of a large flower-growing establishment has become so complicated in detail that it is almost impossible for one man to give each part its proper degree of attention. What is considered the minor duties, though in many cases really the most important, are too often left to the care of those who have no other qualifications than of being cheap and handy. Growers can no longer afford to take chances, and men are in demand that have demonstrated their ability along one particular line. It demands a very high degree of intelligence to grow flowers so as to have them to sell every day in the year, besides an extra supply when necessity demands.

It has become more than ever essential that site, soil, and structure be taken into consideration when building commercial greenhouses. It requires just as much care in this as in the selection of a suitable place for a peach orchard—nay, more, for the orchard may not have cost so much to begin with, and if land and location are not suitable for the purpose it will soon give way for something else; but with an ill-selected site for a greenhouse a man may be handicapped all his life.

More growers are suffering from lack of forethought in this, as their land is far too valuable for greenhouse purposes, and their ill-arranged and badly constructed houses take all they can grow to heat them, than from either dull times or low prices.

I do not wish to criticise or belittle the men who through hard work and determination have done the best they could, but just how they are going to adjust themselves to meet the reduced value of their products is a problem that each man must solve for himself.

The specialist who starts out with a knowledge of what he wishes to grow, and the ability to provide suitable conditions for his crops, has

many advantages over those who are compelled to make the best of what they have. He will be able to see where others make mistakes; it is for him to do better. He can study out for himself the many economic and scientific principles involved in selecting site, soil, and structure that a man with less experience would never think of, and yet absolutely necessary to know if he intends to keep up with the procession.

I fancy I hear some one ridicule the idea of putting up expensive houses and paying high-priced specialists in times like these. I may be visionary, but unless I greatly mistake the signs of the times everything points in this direction.

It is with flowers as with wheat or peaches—some men are more adapted to growing them than to selling them. The qualifications necessary to success in either are so different that they have no particular relation to each other. It is seldom that we find the two qualities combined in one person.

Just whether it pays growers of flowers to carry the stock of decorative and bedding plants is another question for them to decide. It is of itself a distinct feature of the business that the wholesale flower-grower of the future may well shrink from entering—especially if he is situated any distance from a city. It requires an equipment in the shape of show houses, with expensive decorative plants, and a supply of labor that a man of limited means can not afford to have. It is for each one of us to find for himself what he is adapted to, what his sympathies and possibilities are, and when once decided let him do that one thing well. Each man has a place in the world, and he usually finds his level, as do the waters of the sea. The florists of the future should take fresh hope. The dark cloud has commenced to show a silver lining, and I fear not that they will adjust themselves to circumstances, and will continue to extend their work and influence among an appreciative public.

THE CARNATION.

BY MR. N. B. STOVER OF GRAND RAPIDS.

The great improvement in this grand race of flowers, in the past few years, has directed popular attention to them. Until now they are perhaps exceeded by the rose alone, in the number annually grown for cut flowers. In looking over the list we can not find those we thought at that time the finest that could ever be produced. Those noble varieties that we prized so highly and watched with so much care, have all been numbered with the past, and we think still, as each new variety makes its bow for public favor, the height of perfection has been reached. I truly believe they will still improve in the future as they have in the past, until the rose must step to the second place. The popularity of the carnation is on the increase, and it is now grown in almost every city in the United States and Europe. Grand Rapids florists alone grow annually nearly one hundred thousand plants to supply the steadily increasing demand. In discussing the carnation it will not do to forget that it is a biennial, half hardy, requiring a period of rest, and makes its largest and best development in a comparatively low temperature. And yet it must have an abundance of air and sunlight to make it a success, and it is absolutely necessary to have every plant well tied up so that air can easily get all around it. Each florist uses for that purpose stakes or wire coils, or some form of support. We use a stake one half inch square and eighteen inches long, with a spiral coil tacked to it, and place the plant inside of this, which we find is the most economical carnation support we have yet seen or heard of; and the cost is so small compared with other supports that I can recommend it to any one. The stake will last about three years, and the coil can then be taken off and a new stake easily put on. The cost of this support is, as close as I can get at it, one fourth of a cent each, and one man can make from five hundred to six hundred per day. This support was invented by J. A. Creelman of this city.

It is a very difficult matter to say which are the most profitable varieties to grow. I will only name a few of the very best commercial varieties, and I can safely recommend that the following have been, so far as heard of, profitable to those who grow them. We will place Daybreak at the head of the list. Too much can not be said of this grand carnation; the color is a charming shade of flesh pink, a delicate shade which suggested its name, "Daybreak," because of similarity to the first faint tinge of pink seen in the eastern sky at sunrise. This variety became so popular with flower lovers that the blooms readily sold for more than any other variety in the Chicago market the past two seasons. It is not my intention to linger with long descriptions of each variety, but will mention a few of the very best. Wm. Scott, rose pink, is a new variety, and is becoming very popular. Silver Spray is white as its name

signifies, and is the most profitable white up to the present time. Ivory is another new variety which is a very fine white. This being its first winter away from its birthplace, it is very difficult to say what its future will be. In red we have the old standard varieties, Portia, President Garfield, and Emily Pierson,—President Garfield being a late-blooming variety while the other two varieties are early bloomers. But all the red varieties of carnation must bow their heads and step aside to allow Murillo to enter the competition world. It is by far the finest and grandest red carnation that has ever been grown. We have taken a great interest in this variety, as it was originated by a Grand Rapids firm. It has all the good qualities required—a good grower, good bloomer, and is sure to be a profitable variety. It will I believe be disseminated the spring of 1897. In yellow we have Goldfinch as the best, with Mayor Pingree as a close second. I might go over the list and name fifty varieties which have been tried, but I have named the very best.

The disease to which the carnation is most subject is what is called carnation rust. Now, we have all lived in dread of rust. I know I have, and kept it from my houses for three years after all my brother florists had it, but at last it crept in; and I do not think there is a carnation-grower in the country but has had more or less fear of its ultimate results in the cultivation of the crop in his greenhouses. Present experience goes to show that an arsenical preparation will absolutely annihilate rust. Fowler's solution is dissolved arsenic. Use at the rate of one ounce to eight gallons of water. This solution can be obtained at my drug store, the prescription being as follows: Arsenious acid, 616 grains; bicarbonate of potash, 1,236 grains; water, four ounces.

Cuttings can be taken any time from October to April, but I would advise early propagation, say December 1 to 15. Use four inches of clean, white, and tolerably coarse sand, then place your cuttings in; after they have been in about four weeks they will be well rooted, and can then be put into boxes about three inches deep. The cuttings should be planted out in the garden about the first of May, in rows about twenty inches apart and one foot in the rows. They will now need constant attention, keeping the weeds down and cultivating them about every two weeks. Disbudding should be done at intervals during the summer, whenever the buds appear, until the 10th of August, at which time the plants should be stocky, well set with blooming shoots. It will now be time to begin to prepare the greenhouses for them, your soil having been previously prepared of three parts dark, sandy loam and one part well-rotted manure. Now comes the particular part of carnation-growing, that of lifting; it can not be expected that we should all think alike, or that the same way of lifting carnations would give the same results with the grower. The soil, variety, manner of lifting, and transplanting, are all important factors in determining the success of the operation. Most of the varieties can be taken in with but very little soil on their roots. If the soil is sandy, it is much better to have it off, but care should be taken not to let the roots become dry. If the soil is heavy it will naturally cling to the roots, and it would be injurious to the plant to try to take it off. I most assuredly recommend that, when it is possible, all the soil

be shaken off; by this operation they have a short period of rest, and you will find that they start much more readily. After planting give a good watering. They should then be shaded a few days, and syringed about four times per day until the fibres begin to work. Along about the first of December is the time to commence liquid manure, very weak at first and increasing a little stronger every month. This should be done about every two weeks, care being taken to not overfeed nor use more than one kind of manure at a time. I have tried to make everything plain as possible, and sincerely hope that some one may be benefited by what I have said.

ROSE CULTURE OUTSIDE AND UNDER GLASS.

BY MR. HENRY SMITH OF GRAND RAPIDS.

We find mention of the rose in the earliest writings, both sacred and profane; and probably no flower at the present time is so highly prized or will be found growing in such a variety of soils and climates. The species, numbering upward of a hundred, are found disseminated throughout Europe, Asia, Africa, and America. China, Persia, and India have furnished some of the finest species. Cabbage or Provence rose is one of the best known and oldest of the family. Hybrid Perpetual roses are probably the most useful in this section for outside planting, as they will stand our severe winters with little or no protection, have all the qualities—as size, fragrance, profusion of bloom, etc.—requisite to a first-class rose. Of this class I would mention Coquette des Alps, Annie de Diesbach, Captain Christy, General Jacqueminot, Paul Neyron, Magna Charta, Mrs. J. H. Laing, Prince Camille de Rohan, Ulrich Brunner, etc., as among the best. Many of the teas or ever-blooming roses are planted out with good results, also several of the hybrid teas. When well protected they may be carried through the winter in good shape. Of the first class I would mention Pearle des Jardins, Madame Hoste, Papa Gontier, Sunset, Queen, Malmaison, and Souvenir d'un Ami as among the well-known varieties.

In hybrid teas, such varieties as LaFrance, Meteor, Duchess of Albany, Kaiserin Victoria, etc., always give good satisfaction. In hardy climbers, such varieties as Prairie Queen, Baltimore Belle, Seven Sisters, and Crimson Rambler are true and tried. We might add to this list one or more other moss roses, but no list is complete that does not contain the names of Clothilde Soupert and Hermosa, both old varieties but among the best, either for bedding out or for pot culture. With the above varieties to select from, and a little care to keep down the rose slug, either by spraying with Paris green or dusting with white hellebore when needed, success in rose culture is assured. Strong young plants of any of these varieties can be had for not to exceed a dollar and a half per dozen, and a few dollars invested in them will give a succession of bloom from

June until snow flies—will adorn the house, delight the heart of the owner, and be a blessing to the community.

Growing roses under glass requires much more labor, attention, and care than the production of any other family of flowering plants used by the commercial florist. Some of the requisites to successful rose-growing are even temperature, plenty of water under strong pressure, well prepared soil, which should contain a large percentage of clay; this should be renewed each year and planted with strong, thrifty young plants early in June and July. These plants should be in four- or five-inch pots, grown from cuttings taken in January, February, and March from bearing wood. Each year there are a great many new varieties of rose sent out, but my experience has been that it is best to stick to the old and tried varieties, as a large percentage of the new sorts are worthless, although there have been some grand additions to the list of forcing roses the last few years. Among them I might mention American Beauty, Meteor, Testout, Kaiscrin Victoria, Bridesmaid, etc.

The varieties that give the best results to the commercial florist are Pearle des Jardins, Bride, Mermet, Bridesmaid, American Beauty, Meteor, Kaiserin Victoria, Testout, LaFrance, Queen, Wooten, etc. These are all standard varieties. A few of these require more heat than others, but most of them can be grown in a temperature of from 58 to 60 degrees night heat.

There never has been too many first-class roses, or other standard flowers, to supply the holiday trade, but to care for this increased demand there are so many greenhouses planted with roses, carnations, and violets, that there is sure to be an over-production of these flowers each spring and fall.

Roses and other cut flowers are shipped to any part of the country that can be reached in 48 hours or less, in perfect condition.

Like every other business, strict attention to little things goes far toward making a success of rose-growing, and no florist should undertake to grow roses unless he is prepared to give them untiring attention.

FRUIT RESOURCES OF CANADA.

BY PROF. JOHN CRAIG OF CANADA.

I regret very much that I have to start what I am ashamed to term a lecture by an apology. I had arranged a series of slides illustrating some of our Canadian fruit resources. Unfortunately, just before I had the pleasure of receiving an invitation from your secretary, I loaned the slides for another purpose, but learning that I was placed on the programme for this subject, and thinking you might possibly be interested to some extent in knowing what we in the cold north are doing in growing fruits of the various classes, I brought along all the slides I had, and trusting that you will bear with me, and that your imagination will supply any deficiencies there may be in the slides or in my discussions, I wish briefly to take you for a trip across the continent, beginning at the eastern boundary.

We have quite a little strip of country to the north of you. I know that the people of the United States have a very fair idea and a very fair impression of the importance and the size of their own country, and I think it is a splendid thing for every individual, no matter what flag he lives under, to think that there is no country under the sun like his own country. I am only sorry to find that since I got here I am greeted by so many friends. Now, that may seem rather peculiar, to say that I am sorry to be greeted by friends, and I know at least a half dozen persons who have come up and shaken me by the hand, saying they were brother Canadians. However, just to give you a rapid idea and a comprehensive one of the extent of our domain—I know you usually imagine that Toronto or Montreal, which is the metropolis of our country, is about the geographical center east and west, and if you have that impression you are considerably mistaken, because you have to go nearly two thousand miles west of that before you strike our geographical center east and west, so that Winnipeg is near our center.

We have in Canada, as you in the United States have, an experiment station system which has for its object, as I say, the horticultural as well as the agricultural interests of the Dominion. We manage our station work somewhat differently, and I will just give you a brief outline now of our system, and later I will give you some views of our farm to bring you nearer to our work. The institution which I speak about is under the management and control of the federal government, corresponding to your federal government at Washington. We have a central farm, a central station at Ottawa, the seat of government, and we have in each of the other provinces branch stations to do the work for the provinces, and the work is taken as a whole from our central station at Ottawa and results are collected, collated, and published from that central station. We have not been in existence as long as some of your stations have, and we have not done a great deal, yet we have done some-

thing. However, I am not going to blow our own trumpet in that way, and will suffice with a brief resumé of our experience in experimental work.

Fruitgrowing in Canada, as I have no doubt is the case in the United States, has come to be something like this: In each of the centers of early settlement or early civilization the settlers brought in their fruit trees and brought in such as did best in their old homes. They planted them here, and if they did well they gradually spread from those centers along the lines of least resistance—that is, along those lines where trees grew best, and so spread out and worked over the whole country, gradually finding here and there a spot best suited to the cultivation of some particular class of fruit, so that in Nova Scotia we find our whole area very well suited for cultivation of some particular kind of fruit. In Quebec, and in Ontario again, we find that a particular area is best suited for bringing some particular fruit to the highest state of development; and that is a part of our work in the experiment farm, just as it is in the experiment stations here. I was pleased this afternoon to find (and I may tell you that it was very gratifying information to me) that our fruits are creating such a stir in the Chicago markets, and to find that we were of sufficient importance to have the fruitgrowers of this state become somewhat exercised in their minds lest we should capture those markets. I did not know it before, and the thought is very inspiring to me, and is one which I can take back to our fruitgrowers and give to them as an incentive to go on and do better things. Speaking seriously, this brings me now to the reason why I think apples, for instance, in certain localities in Ontario are better than the same varieties grown in Michigan, and it is this: That, so far as I have been able to observe, the further north you go with a certain variety of apple, until the furthest point north where that variety can be successfully grown is reached, there you will produce fruit of the best quality. Just so long as the season is favorable to the growth of the tree and the ripening of the fruit in that place, you will have fruit of the finest quality. That has been my observation in Canada, and for that reason at those points Mr. Rice mentioned this afternoon, such as Prince Edward county, we find the Northern Spy growing, and to an excellence in point of quality and appearance that I do not think is equalled, certainly not exceeded, in any other portion of North America.

In speaking of our first province, I will go down to our eastern boundaries. We have a little island there of which the residents think a great deal. It is called Prince Edward Island. It is a beautiful little island, about 120 miles long by about three to five miles wide, and the peculiarity of this island is what was called the English cherries in the early days. The cherries which were introduced from England, brought over by the settlers, of the Kentish varieties, grow there remarkably and produce themselves from buds; they have been growing for generations, over a century, anyway, from sprouts and buds, and we find the English cherry growing all over that island, in great profusion, and the climate is such that the growers are enabled to send the cherries to the Boston market at least three weeks after the cherry season, and being somewhat of a novelty, and the growth being comparatively limited, they are enabled

to dispose of them to great advantage. We are instituting experiments in fruitgrowing there which I have no doubt will be very successful.

You have known Nova Scotia by reputation, probably, on account of production of Gravenstein apples. Nearly everyone has. As I said before, there are certain localities in the province of Nova Scotia where that variety seems to have come to the highest state of perfection. Nova Scotia was one of the earliest provinces to begin exporting apples. In 1873 there were 30,000 barrels of apples exported to the British market. The industry has grown rapidly, and owing to their favorable location, being right on the seaboard and having good communication with London, it has grown, until last year Nova Scotia exported over a half million barrels; and this year, I am credibly informed, the export will approach one million barrels to the London and Liverpool markets, and those are nearly all Gravensteins, Northern Spy, King, Nonpariel, and varieties of that class. If Professor Taft were in Nova Scotia he would find apples around there that he hadn't heard of or known in the northwest at all. There we find dozens of kinds that have not succeeded in our western climates, principally on account of the fact that the foliage does not seem to stand our dry seasons. Yet in the provinces where the salt breezes come up the bay of Fundy, and where there are many small rivulets, and the tides rush up and modify the atmosphere, and the air is more or less impregnated with the moisture of the salt sea, we have these old English varieties which succeed very well; so that we find Grass Pippin and all the pippin class growing there very widely.

(Professor Craig here illustrated his lecture with stereopticon views.)

New Brunswick is not a fruit-producing country. Cranberries and raspberries grow wild in great profusion, and they ship large quantities of raspberries to the market at Boston, three or four weeks after the ordinary raspberry season is over, and secure very remunerative prices.

You will be surprised to know, perhaps, that in the different portions of the province of Quebec we are able to grow grapes to some extent and with considerable success—surprised, because we have a temperature considerably colder than yours, and we count on sleighing from the middle of December until the middle of March; but our extremes in the matter of cold are not so much more than yours, and by giving the grapes some protection by laying them down in the autumn, and pinning them to the earth, and giving them a small amount of protection in the way of soil, they come through without any injury. They are pruned, of course, before this is done, and the work of laying them down really is not so heavy as you might suppose.

I have not anything more to say, except to emphasize just a word that Mr. Garfield brought out, bearing upon the influence of horticulture upon our homes, and I can only close by quoting the words which I heard fall from the lips of that venerable pomologist, Marshall P. Wilder, some years ago, who said, I thought in very beautiful language, that fruits were the overflow of God's bounty, that they were gems from the sky dropped down to beautify the earth, gratify our tastes, and minister to our wants. The more we realize this the more we shall appreciate divine goodness to us and the duty of providing fruits for others.

PRESENT AND FUTURE OF APPLE CULTURE IN MICHIGAN.

BY MR. R. H. SHERWOOD OF WATERVLIET.

This eventful year of 1896 is drawing to a close, and as it slips into the past let us give it a fair retrospect as regards the culture of apples, basing our opinions and views upon the experiences of the year.

Business, generally speaking, has been done only at small margins of profit, no one buying except when necessity demanded the purchase. Strictest economy in all lines has restricted our consumption in all the products of the farm, the result being that farmers as well as all producers have been living on small margins of profit.

Ordinarily the farmer believes his lot the hardest, and, when he reviews the year with its low prices, believes nothing is quite so unprofitable as his business. It is a fact that, when general business is prospering and consequently prices are good, the products of the farm are in increased demand; and we hope farming as an occupation may be added to the industrial wealth of this country more in the future than in the past.

The fruit interests of this year have had, probably, what will not occur again, in regard to excessively abundant crops, but I believe the real and true cause of the low prices to be under-consumption rather than over-production. This applies more particularly to other fruits than to the apple, for we know the average crop for the country of that fruit, as compared to last year, is practically the same. The government report for November gives it as 65.5 of a full crop, and it corresponds to my most reliable source of information, outside the government report, the estimate of the Orange Judd Farmer giving the figure for the year at fifty million barrels as compared with fifty-five million barrels last year.

Early in the season I received a report from an apple-man to the effect that this year's crop was 216 million barrels, but in conversation with a buyer who was in a position to know, he said to cut the above estimate in two and then cut again, which brings it down to fifty-four million barrels, which I believe will be much reduced from that figure. I am no "prophet nor son of a prophet"; but, taking the situation as we find it, viz.: great waste in orchards, poor keeping quality of the apples, and increased prospect for consumption, and a greatly increased foreign demand, it appears to me that the prospect is good for higher prices in the future. A five-cents-per-barrel rate from Buffalo to Chicago by boat has given Michigan severe competition in marketing her crop, which will result in much of it being wasted. In driving through the country and seeing the ground covered with handsome fruit, the old adage comes to mind, "wilful waste makes woeful want"; and right here I will give it as my opinion that those orchards where the apples are left to decay on the ground will be infested with moths and millers to an unusual degree another year.

My windfalls netted me about \$300, and I did not touch the larger share of them, for over one hundred head of hogs picked them all up for me, so there is not an apple to be found on the ground in any of my orchards, and the hogs improved all the time on the feed. I adopted my usual method of sowing my orchard to peas. The hogs have eaten the peas, pods, vines, all the apples, and have plowed the orchard besides, which more than repays my outlay of \$75 for peas. We turned the hogs into the orchards about July 20, and never fed a bit of grain until November 10; and when comparing condition of orchards and hogs, the result certainly was satisfactory.

In comparing orchards on sod to my cultivated orchard, it was very apparent even to a casual observer that the fruit was better on the cultivated trees, and I believe we find a better growth of the next year's fruit buds. A great many predict a short crop for another year. I believe my trees will bear a fair crop, judging from the present prospect of fruit buds.

The importance of fertilizing an apple orchard can not be overestimated, and I believe horticulturists generally are becoming more in favor of cultivating and fertilizing any bearing orchard. It has been my experience with apple orchards that, in the past eight years, they have not failed to bear a good crop except one year, while many adjoining orchards have not had so regular bearing.

Allowing an orchard to grow a thick sod of either June grass or timothy is exhaustive to the soil. If carefully observed, it will be found they absorb all the moisture of the summer, it requiring an unusually hard rain to wet through this blanket of roots and fibers. This season of heavy bearing it was particularly noticeable that apple trees, notably Baldwins, that bore so heavily, bore smaller fruit in grass orchards than in those cultivated.

An acre of wheat at twenty bushels per acre gives twelve hundred pounds of grain. An acre of apple orchard at two barrels per tree, seventy-five trees, gives us 22,500 pounds of fruit; and the tree should be fed with expectation of better foliage, to produce better fruit, as land should be replenished after frequent crops. The apparent neglect of the apple orchards is possibly the reason for feeling that they are not profitable, and many have been cut down within the last five years, the ground either set to peaches or used for farm crops.

My idea of fruit-farming, as an exclusive occupation, is to have the whole variety of standard fruits—apple, pear, peach, and plum, so we can reasonably expect a crop from some of them. I make this application to Michigan particularly. In this year of excessive bearing it became apparent at an early date that the apple trees were going to break down with their enormous weight of fruit, if some means were not used to relieve them. It did not seem practicable to thin them, when I found that our honored president had tried it, and a good man had thinned a tree and a half in a day, so I relied upon nature's thinning and stayed my trees by wiring—not, as was recently advised by a prominent farm paper, by putting the wire around the limb and twisting tight, but by putting large screw-hooks on the inside of the limbs and wiring around the entire

center of tree by using the most prominent limbs and then twisting the wire tight. I know of several large Baldwin trees I saved in this manner. We used, also, 30-penny wire spikes and drove them into the body two thirds of their length, and then bent them with large pinchers into a hook. This is a quick and safe way. I put the hooks into the limbs about as high above the crotch of the tree as a man can reach, giving the tree a strong support. I used No. 9 galvanized wire.

Several articles have been written in our papers about this year's quality of apples, and it was questionable whether spraying really paid or not. It has been my actual experience this year, in comparing sprayed with unsprayed orchards, that the apples were more wormy, and especially were the fungus spots more noticeable, on apples without spray. The favorable conditions of the past season have seldom been experienced in one year, and we believe the orchards that were thoroughly sprayed this year will not have so much scab and fungus spots on their fruit next year, as the effect of extreme moisture the last part of the season was conducive to all fungous growth, which is likely to appear on the fruit next season.

Much has been wasted this year and allowed to decay under the trees, a poor fertilizer and an excellent breeding-place for worms. It seems reasonable to believe that time is well spent if used in picking all fallen fruit from under the trees.

The advisability of setting more apple orchards in Michigan I believe is apparent, in place of very old orchards, as they are certainly past their prime and usefulness when not bearing even a reasonable crop, and many of the orchards have varieties which very poorly recommend themselves to the buyer, and we must raise what the market demands. Apple-growing in Michigan can be made as profitable as in the southwest, where the largest orchards have been set, and it remains a fact that the most desirable market apples grow to their best development in this latitude; and, most of all, the market is within reach.

My own crop of winter apples (picked) was over 10,000 bushels, and I put them in my barns and cellars, as usual, in large bins, and began packing as soon as we had finished picking. During the summer there was criticism upon my method of piling apples in bins, given by one of our horticultural papers. This year was a good one to judge the scheme, whether the apples were injured, but we found them in good condition. There was a bin of 3,500 bushels of Greenings that were piled over seven feet thick, and remained over four weeks before packing, with no apparent injury. It is my opinion that apples are cold on the trees when picked, and if hauled immediately into the shade they keep their temperature more evenly than when exposed in the field. My ideal method, if it can be done to advantage, would be to barrel immediately from the tree and head-up in tight barrels, as the temperature would certainly remain more even for a longer time under those conditions.

My actual experience this year with the present apple crop remains to be proven as to profit or loss. I have about 2,000 barrels in Chicago, in common storage, consigned to one commission house. I have also about 600 barrels of choice Red Canada, Ben Davis, and Baldwin in my fruit cellars and am waiting for the advance. I believe it certainly will come, but

its movements are slow. Nearly every space of cold storage is occupied, the property of men who believe in an advance of prices. Most of the apples in storage are there at a cost of about \$1 per barrel, and some over that price, and most of these apples are owned by men who make it their business, and certainly almost know the future of the trade. Apples do not appear scarce, from a trip through South Water-st., but my conclusions as to the future have been based upon estimated reports and as many apple-men look at it.

Pardon this digression. I am not a reformer nor an advocate of new and untried economic schemes. However, it does seem apparent to me that the producer should have something to do with making a price on his product. All other lines of business are so arranged, or they "shut up shop". As it is now, the middle-man, or rather, the speculative interest, governs that important part, and when they continue to "bear" the market, down it goes, and these periods of "over-supply" and "large-supplies" occur at exactly the time when the average producer figures to pay for the cost of his crop, and seldom does he figure on any profit, for his experience teaches him to "clear himself" after the year's hard work, and pay his taxes and store bills, to commence again another year. Don't infer that I am one of these "calamity howlers", but this view of affairs of this kind seems apparent and it admits of solution.

After viewing the apple crop of this season, and understanding the difficulties encountered, it certainly will result beneficially to any interested observer, as an experience that should result as a practical object lesson. "Experience is our best teacher", but, as my father often said, "don't pay too high for it".

I have faith in apple culture as a source of profit, and when we compare this year's fruit prices (all included) it certainly has much to commend it even at these extremely low prices.

"Work without hope draws nectar in a sieve, and hope without an object can not live."

BY MR. S. B. SMITH OF GRAND RAPIDS.

The apple has been styled "The king of fruits", evidently because of its pre-eminent excellence. It has an extended history, originating in the temperate portions of Europe and Asia, cultivated by the Romans, passing thence into this country, and has become a staple product among fruits in all temperate climates. It has had its past, it has its present, and will have its future. As the present exceeds the past so the future will exceed the present. It has so many adaptations to the wants of men, it can not be dispensed with. Because of this, it has a prominent place in our markets, and is reckoned as one of the many crops of the country. Its history has been varied, and likely will be in the future. All earthly things fluctuate. It has had its periods of brilliant sunshine and gloomy shadow. For several years the apple crop has been a partial or total failure.

The peach has seemed to dispute its right to the crown and would take from it the sceptre of fruit sovereignty. Some fruitgrowers have dug up

many of their apple trees and planted the peach instead. Few apple trees have been planted, but train-loads of other kinds have been set. I would not under-estimate other fruits, nor would I forsake the apple.

This year, bright sunshine has returned to the apple with unexampled brilliancy, the largest crop in quantity, and the best in quality, in its history in this country. The present of apple culture is full of experience, observation, instruction, and admonition which are calculated to produce its future. We may judge of the future not so much by the past as by the present. Apple culture is destined to have a prosperous future. I note some present indications of it, and will suggest some things necessary to it.

I lay no claims to special originality, and promise no new and startling discoveries on this subject. The topic has been considered and discussed again and again by our brightest minds and most experienced fruit-growers. If I can but emphasize what has been better said or written before, it may be of some use to some persons. On this as on other subjects, we need line upon line and precept upon precept.

The people are becoming better informed with reference to the causes of failure in the past and the conditions of greater success in the future. Discussions in horticultural meetings, state and local bulletins from our agricultural colleges and experiment stations; our horticultural journals and kindred literature, experience, and practical and scientific investigations, are all important educators. These instructions are not in vain; they are being applied in practice. I greatly acknowledge my indebtedness to all of these agencies. Appreciating these advantages, I am here as a learner today, and also a constant reader of several journals on this subject. Whoever improves such opportunities is a gainer, whoever neglects them does so to his great loss.

The planting of an orchard lies at the foundation of success in each individual case. A suitable location and proper selection of varieties first claim attention. Whether for the family or for commercial purposes, the location as to the soil, altitude, and air drainage are the same. The selection of varieties is quite different. In the first a succession of fruit ripening through the season; in the second, few varieties and these mostly of winter sorts. In the first, quality should be specially considered; in the second, adaptation to the purpose should determine. In the latter case, an orchard of large size has advantages. More system and better equipments are likely to exist. Attention is more likely to be engaged from abroad, and dealers can better afford to come, examine the stock, and purchase. The qualities most desirable are color, hardiness, good bearing, good shipping, and long keeping. Where possible, quality should be added. One having most or all of these points, and lacking somewhat in quality, would be more profitable for market orchards. Such an one is Ben Davis. If one wishes to criticise it, he should judge of it before it is ripe, which is at or near spring. I do not claim for it first quality even when ripened, but it has many excellencies, it stands high for commercial purposes.

This fall, a firm of wholesale fruit dealers desired all my Ben Davis stock and wished no other, but would take the entire crop, as so large a part of it was of this variety, should prices be satisfactory.

Baldwin, Red Canada, Northern Spy, Jonathan, Willow Twig, Greening, American Beauty, and Golden and Roxbury Russet are among the excellent varieties for this purpose. King, Westfield, and Hubbardston are more desirable for early winter than the Russets, because of their color. Ben Davis and Russets are best for late keeping.

Planting too close is a common error. I made that mistake in planting a portion of my orchard. The branches interlace and the ground is too much taxed and shaded. Two rods apart is near enough; further, rather than nearer. Especially is this the case with trees of a spreading habit. Some have advocated close planting, and when the trees become large enough to interfere, cutting out each alternate tree. When they come into bearing they need the whole ground. Furthermore, but few would have courage enough to cut away one half of an orchard. We are learning that one crop for the ground is enough at a time.

For four or five years after an orchard is set, some hoed crop may be no special disadvantage, since it secures cultivation that might otherwise be neglected; but, after it comes into bearing, the trees and fruit should have all the ground. We are learning to cultivate our apple orchards as a crop. Give them the same degree of cultivation experienced growers give their peach orchards, and we would hear less of "Apple culture don't pay". Crops, or grass and weeds, take moisture and nourishment the trees and fruit need.

The apple is more patient under neglect and abuse than most other fruits. There is a time, however, when "Forbearance ceases to be a virtue". Emphatic protest is made; the ordinary annual growth is mostly withheld; the limbs and body are moss-covered, and the tree easily becomes a victim of disease and insect enemies. Many of us do not apply the knowledge we possess on the subject. Sometimes we seem not to have the time, and sometimes we lack present financial ability to hire the work done. Shall I say that in some cases it is lack of energy or knowledge, and perhaps both?

We are learning to fertilize more. The soil, however good, can not bear continual cropping without exhaustion. It must be fed. Horace Greeley illustrated this sort of starvation by a homely but forcible figure: "Tie a cow to a stake. She will live as long as the grass within the limits of the rope holds out. She will starve afterward." One reason why orchards were formerly more fruitful than many now are, is, the virgin soil had not been exhausted. What nature did then, art must do now. It is vital to the future of successful culture.

Judicious pruning is also a factor in future success. This should begin with a tree as training does with a child—in early life. Twenty acres of my apple orchard were planted with trees of but one year's growth from the graft. Pruning began early, a little at a time. At first the top is kept balanced; then by degrees cut off the side branches till they are made to head about three feet from the ground. After the head is formed, thinning is about all the pruning needed.

Some of the advantages of planting trees so young are: the first cost is much less, freight is less, more of the root in proportion will be taken up with the tree, the planting is almost as easily and quickly done as the

setting of cabbage plants, and the trees are made to head more uniformly. The thinning of fruit is accomplished in a good degree by pruning.

Fungous and insect enemies have made spraying a necessity. Doubters are few. Experience confirms believers. Crops of canker-worms and codlin moths are common, and various forms of disease prevail where spraying is neglected or but partially done. As a condition of future success, those who do not spray, must; and many who do, must spray more.

The best time and manner of gathering the crop is important. Many of us delay beginning too long. So soon as the seeds turn black and the fruit cleaves easily from the stem, it is time to begin. This, with winter varieties, will be about the last week in September. Those ripening first, and most likely to drop, should be gathered first. Ladders pointed at the top, half-bushel baskets with hooks on the handles, bushel baskets to handle the fruit in taking to the place of storage, and trucks with bolster springs with which to convey them, are useful adjuncts to the apple harvest. Some improved step ladders have recently been manufactured, and these are useful for the purpose. The platform truck in use with us carries thirty bushel baskets at a time. As a rule, the fruit can be taken directly to the cellar or fruit house. Varieties having dark spots, as some Greenings and a few other varieties have this year, would better be stored in a manner to secure the best ventilation. I noticed that such fruit developed these spots most that was in the center of the bin. These bins were in the barn, above the cellar. I think the method in use by Mr. Sebastian Smith of Watervliet, in cribbing the fruit in the orchard, would be good in such a case.

Where the crop is to be held for sale in the winter or spring, the method of storage should receive special attention. I refer now to methods that are practicable for ordinary fruitgrowers. Cold-storage by the use of ice or chemicals, in large and expensive buildings, as in the large cities, we know to be effective; but such method is too expensive for individual fruitgrowers. What seems to be necessary is a plan of cold-air storage without the use of ice or chemicals, where large quantities can be kept with a good degree of perfection.

For the storage of a large quantity in a given space, I have followed the practice of Mr. Welch of Plymouth, Wayne county, and with good results. He stored in the cellar of his residence, one bin the length of his cellar, about three and a half feet wide, piled as high as he could turn a basket; and then another next to that, until his cellar was filled. He did not handle them until shipment in the spring. I have added somewhat to his practice. I store in a cellar under a bank-barn. A house cellar is too warm. It is not good for the health of the family or for the fruit to be so stored. Besides, I have covered the floor and sides with narrow boards an inch apart, and have an air space of two inches between the board and cement floors and between the sheathing and walls. It will be a still further improvement to add a feature of the grape-house of Mr. Munson of Grand Rapids—the laying of tile four or five feet under ground, to conduct cold air from outside into the cellar, with a ventilating pipe through the roof to carry warm air off; these so arranged so as to open or close as desired, the diameter of the tile and ventilator to be according to the size of the storage room.

My cellar is 32x44 feet, and is divided into three sections. The sections are filled with bins three and one half feet wide and fourteen feet long, and as high as a basket can be turned, say seven and one half feet high. When one bin is full, another is made next to it and filled, and another, until the section is full; then the section at the other end is filled in a like manner, and finally the center is filled in the same way. Windows are on hinges. From the beginning of storing till very freezing weather, the doors and windows and ventilators are opened nights and closed whenever the temperature is higher outside than inside. This method has worked well so far. A few years ago, when the cellar was full in the manner described, the fruit was shipped in the spring. Mr. Pleune, who had charge, reported that the apples kept equally well at the top, middle, and bottom; except that at the top, where changes of temperature were more operative, the fruit speckled a little, and at the bottom, where apples touched the board floor, they were somewhat withered. I had feared that those at the bottom might be injured by the pressure of such a large body of fruit, seven or eight feet deep. Waste by decay was about one barrel to a car-load. The cellar is now full, and they are keeping well.

Successful marketing is as important as successful growing for commercial purposes.

Shall we sell in autumn or later? That depends on the price in autumn, on how many are selling then, and whether the grower has facilities for storage for the winter months. If all sell in autumn, prices will be as low as a glutted market will make them. Distribution in times of sale is kindred to distribution in places of market. Growers should study the market reports from various places; should consult the reports from the department at Washington, to ascertain where the apple crop is small; and last but not least, associate in organized form for market purposes. As one doing business on a large scale can purchase, sell, and obtain better freight terms than others, so can many combined and acting as one get the same advantages, and these in proportion to the volume of business done.

Why not employ associations on a smaller scale to utilize the lower grades of our apples? Does it not seem practicable for several fruitgrowers to join in building a factory for evaporating, for jelly, and for vinegar? While it might not be urged as a profitable investment for revenue, yet it would save that which otherwise would be lost or disposed of to less advantage. Growers in western New York are wise, or very unwise, for they have a large number of evaporators in some form.

Apple culture has many conditions of success; it may have many causes of failure. Success or failure depends largely on the men who are engaged in it. It is to be made a success in the future as the conditions of success are observed; a failure, in the measure in which they are neglected. The present has been the most fruitful year in the history of the apple crop in the northern portion of the United States. It serves to stimulate faith. It indicates the possibilities of the future. Such a series of years of failure in this crop we may never have again. Our orchards may have been storing, in these years of small fruitage, for

this year of great abundance. This vigor seems not to be exhausted, for fruit buds are appearing for next year.

This conclusion seems legitimate: With more faithful use of what we already know, and with such scientific and practical investigation as may be put forth in the future, we may realize greater perfection and profit in apple culture than ever before. Then the apple will yet be styled the "King of fruits".

There is no fruit grown that is so staple as the apple; no fruit that can so nearly be distributed to the four quarters of the world, in its natural state, with so little expense of packing or in so economical a package, and there is no fruit that will receive the uninterrupted demand for so long a season. Therefore, the prices ruling this season should not condemn to oblivion the growing of the king of fruits, the apple, but should cause the thoughtful grower to pause, to inquire into and determine the reason, the cause, why the apple crop of 1896 could not have found a market fairly remunerative. While it is not easy to show the primary cause for the existing condition, to the satisfaction of all, it is fair to say the cause that has placed the products of the farm, of the orchard, or vineyard, the field or forest, of the mill and factory, the product of all industry, on the market at the cost of, or at less than the cost of, production, is the cause of the congested condition of the apple market, and whoever has faith in better times to come, and believes that better values will obtain, as has been the case following former periods of depression, may reasonably expect the apple-grower to profit by the improved conditions, in common with all other lines of industry. While the late apple crop has been a source of discouragement, if we note the lessons brought to our attention it may be a blessing—like some other blessings, at present somewhat obscure, but apparent later to those who profit by the lessons taught, of which there are not a few.

The lesson most apparent to the apple-grower, as given by the conditions attending the development of the apple crop of 1896, is that a crop so early matured must find a market at once. Every day's delay produces a shrinkage which emphasizes the lesson in so practical a manner that it should not soon be forgotten. If the crop had been of less magnitude in the apple-growing area, a good reason for probable higher prices later, it has been demonstrated in a way not to be misunderstood, that so early-matured a crop can not be held profitably for a possible higher market; the loss by decay and frequent handling will more than balance the gain in price.

The fact has again been emphasized, that a mongrel orchard, like mongrel stock, is not good property. Any orchard larger than is needed for family use is necessarily a commercial orchard. To be a success as such, it can not be an experiment station, containing all the varieties catalogued. The grower who offers a large number of varieties with a small amount of fruit in each variety, receives the minimum market price, as compared with the price obtained by the grower able to offer a crop of a few desirable varieties. Hence it is necessary, in order to get the best results, to grow the varieties wanted and the varieties demanded by the consumer. In fruitful seasons, the discrimination in favor of those varieties is most in evidence, and should indicate what to plant and suggest the

eradication of the indifferent or worthless varieties occupying space the lesson teaches us should be filled with something better. The growers who marketed the crop with the least expense of handing were the only ones able to show a profit. If one is claimed for a crop of 1896, the economical method is the practical method, as well employed in seasons of better prices.

The demand for the wormy apple and the apple marked by fungi has been conspicuous by its absence, suggesting the desirability of including the spraying for codlin moth and fungi in the enactment against the canker worm, which should be as diligently applied as the yellows law; for, while the life of the tree is not threatened, the business of apple-growing is. Every over-loaded tree appeals to the reason of the grower, directly through the channel that moves the quickest—the pocket. It takes time, labor, and money to grow a tree, which means that the tree is an investment and should be as carefully guarded, for what it is worth, as any other investment. It should not be over-worked. If a portion of the fruit is removed, either by pruning or thinning, the vitality of the tree is retained, the quality of the matured fruit improved, and the chances less of the tree asking for a "lay-off" four years out of five. The successful apple-grower of the future will be the specialist, the man with the hobby, who believes in the future of apple-growing; he will have the courage of his convictions. The lesson of the late apple crop teaches us that he will have faith in the use of fertilizers, in spray for the fungi and the worm; that he will relieve the tree of unnecessary burden by thinning or proper pruning; he will have the necessary intelligence to apply the fertilizer judiciously, to be timely in spraying, and to thin thoroughly. The fruit will then speak for and sell itself.

The apple is mostly grown in this latitude of the temperate zone, and here attains the best quality, by reason of the different seasons of ripening of the different varieties. It is in use in its natural state a longer season than any other fruit grown in this climate, and if denied us would be missed the most. We will assume the apple to be the oldest known of all the fruits, for no doubt if the variety of the fruit offered by the first man to the first woman had been chronicled, we would find the apple to have had precedence over the vine and fig. Being of such ancient origin, it may be properly recognized as an institution antedating all others designed for the use of mankind—a blessing in the past, a present necessity; and, as the wish is father to the thought, may it always be with us. The veteran samples the first green apple of the season with caution and satisfaction; the small boy in quantities, without caution, but with results. Maiden's Blush is an inspiration; Snow, Red Canada, and Northern Spy, in their season, are beyond description, and the last bitter Ben Davis and corky Russet like wine of old vintage—the best of all.

DISCUSSION.

Mr. Rice: Mr. President, I am going to say, in regard to the paper read by Mr. Smith, that to me he has presented a new method of storing and keeping apples. I was brought up among the apple orchards of western New York, and we never thought of any such thing as that. He advised with me early in the fall, and I told him I thought it was a very dangerous thing to pile apples so deep, that a great many apples would be bruised and they would come out in very bad condition. Now, if his methods are successful, it opens a new field for keeping apples, and it seems to me that it is a matter really worth while for us to investigate. I hope that we may hear some reports on the subject hereafter. I did not suppose it possible to have piles laid more than two or three feet deep in a bin without their bruising, and if they can be kept seven or eight or nine feet deep in a bin, or in a large cellar like that, with the divisions that he gives to the bins, it is a matter of a great deal of importance, because, in a time like this, men in our part of the country have allowed their apples to go to waste simply because it is too expensive to buy barrels in which to store them, and they know of no other way of taking care of them.

Mr. Sherwood: Mr. Smith refers to Mr. Sebastian Smith's method of cribbing apples. I will say I know of his experience, and he advises it, particularly with the black spots we have found within the last two or three years on some varieties, such as Baldwin and Greening; but Mr. Smith's experience in that line has not been very favorable. Last year, out of a crop of about a hundred barrels of Baldwins, if my memory serves me right, he only got about fifteen or twenty barrels of No. 1 apples, and he concluded that change of temperature, or being exposed in that way in the orchard, increased the spots on the apples, or brought them out more, as he thought they were not on the apples when he put them in the bin, and this year he has put some in bins and a good many in his barn. That was his experience last year.

Mr. Morrill: I would like to ask what is meant by this spot? It is not a scab, it is a cloudiness in the skin—is that what you have reference to?

Mr. Sherwood: It is seen on the Baldwin, and it is a fungus, as I take it, and if I am not mistaken it is called "bitter rot." The flavor is bitter. It is particularly noticeable in Baldwin. It is a perfectly black spot, about as large as a pea. It is found on the surface of the apple, it changes the flavor of the apple, particularly the Baldwin.

Mr. Morrill: It is on the surface only?

Mr. Sherwood: It penetrates under the skin a little way. It is a little fungus growth, a little woody growth under the skin.

Mr. Rice: Has not ventilating his bins helped that?

Mr. Sherwood: No, sir; I do not think it has.

Prof. Slingerland: I do not know what is meant by this black spot. I have seen it very frequently, on Baldwins, and our attention has been called to it this season, a spot which does not show so much on the skin

as it does below the skin. You cut the skin off, and there you find brown spots, you might call them.

Mr. Reid: That is what he refers to.

Professor Slingerland: I do not know what has caused that or what can be done for it. I submitted some specimens to Professor Bailey, a short time ago, similar to that, and he said he did not know what was the cause or what could be done for it. I think it is peculiar to Northern Spy and Baldwin and also Greening, but I do not know of any remedy except cultivation.

Mr. Smith: With me the Greening was affected more than any other variety, and it seems to develop like a canker, and around it is a bitter taste, about as Mr. Sherwood has described—more this year than any year before, and more in Greenings than any other variety.

Mr. Wilde: I have grown Greenings a great many years, and never saw this occur before, and it occurred worse on trees that were overloaded. It is a black spot, as though the rain had left dirty, soot spots on the fruit, and they wilted the apples. It is a new thing to me. I never had it before, and it has injured a great many apples. Some of my Greenings were not worth taking in on account of that black scab. The other apples were free from it, Baldwins and Spies were entirely free.

Mr. Rice: I think it is produced a great deal by the apples heating. I think that is the great difficulty in shipping apples across the ocean, their heating in the holds of the ships. Our Canadian friends find a great deal of trouble from that. When they get to the European market they are almost worthless from that bitter taste. In the case that I noticed it seemed to be decidedly from being heated, I thought, in the barrels.

Mr. Wilde: I would like to state that under my circumstances it could not possibly have been from heating, because it made its first appearance on the first day of September, on the trees; I first noticed it among the apples on the trees. When they were piled up on the ground I considered the fruit from one tree worthless. They all wilted so that they were like sponges, from that particular tree. Those that were thin or scattered were better.

Mr. Sherwood: There is a difference in the spots. I thought I was right. It has occurred this year on Jonathan. I know I had seen it here, and there it is [showing a specimen] the same thing on that Jonathan. It is different from the spots that occur on the Greenings, that this gentleman referred to. Where it is very pronounced it has left the skin in a withered condition, and this seems to look like a little dent on the apple. It is on this Jonathan that I have in my hand, you can see the spots, and on some Baldwins it will nearly cover the apple. It is something I have noticed within two years.

Mr. Reid: There is something that has been observable on the Baldwin for some time, and more frequently, I think, as a pit in the skin than as a black spot. Underneath the skin there is a brown, withered appearance, a corky substance; the flavor of the apple becomes bitter, and it very often is noticeable on the apples at the time of picking. I have this fall had samples of very large Baldwins brought to my office that would be utterly worthless for any purpose, and it is commonly known among growers as bitter rot. I never saw it among any other apples, and it is

not anything that is attributable to binning or lack of ventilation or anything of that kind.

Mr. Chas. Wilde: I believe that what effects the Greenings this year is simply scab, only it came on later in the season and did not crack the apple, and I think it is the same disease that is known generally as the scab, and that bitter rot seldom appears in the Greening; and if you will get that spot off from the Greening this year you will not see that corky, bruised appearance; but in the Baldwin that often happens, and it is known as bitter rot, as the secretary says. With us it is more prevalent in the Baldwins that are overgrown, and less noticeable on those smaller in size.

Prof. Slingerland: I think Mr. Wilde is right about that. We have three different things, there are two on this apple and neither appears to be like what you are talking of on the Baldwin.

Mr. Reid: Sometimes these spots will occur within the texture of the apple, and not grow on the skin at all, go clear through to the core; but as the apples ripen through the winter they become entirely worthless because of the prevalence of these spots.

Prof. Slingerland: This Jonathan has distinct black spots on the skin and very little below the skin. It is quite different from that on the Baldwin. On the Baldwin you have scarcely anything on the outside, but a deep, bitter brown on the inside. Here is something like Spy, which has these black spots which the gentleman found on Greenings. I never found this brown spot on Greenings, such as you have on Baldwins. I think these spots on Greenings are the genuine apple scabs coming on later in the season. The spots on Jonathan I never saw before. I think the spots on Baldwin are bitter rot. I think we are talking of three distinct things.

A member: What is your remedy for bitter rot?

Prof. Slingerland: I do not know of any remedy for bitter rot. Apple scab, of course, you can prevent.

Mr. Harrison: I think there are two distinct diseases that we are getting mixed up here. One is what we used to call dry or bitter rot, which prevailed in southern Ohio twenty-five or thirty years ago, so that it almost ruined the Baldwin orchards in southern parts of the state, and affected orchards up in the lake region badly. It did not confine itself to that variety, but that was the worst affected of any. Then there is another that is confined more to the surface; that I think is caused by piling the fruit in too large masses when first gathered, before it passes through a heating process. Forty years ago I was engaged quite heavily in shipping apples from New York to Ohio and to Milwaukee, and occasionally we got apples that were somewhat heated in the hold of the vessel, and that spot which resulted was a bitter, disagreeable spot, but it was entirely different from the old disease that we knew in Ohio or have since known in Ohio as dry rot. This hardly ever appears first, I think, on the outside, but commences in the apples, and sometimes, as the secretary says, it does not appear on the outside at all. In paring the apple one gets the first indication that it is there.

Prof. Taft: I would say regarding this disease of which Mr. Harrison has spoken, that it has been very troublesome this year with Fameuse and

several other kinds, and we have been trying to learn under a microscope what it is. We can find no trace of any fungous difficulty, and we are working now on the line of bacteria, thinking possibly something of that kind has worked inside and caused these discolorations, these brown blotches all through the flesh of the apple, but we are yet at sea as to what it is and the cause; but my impression is that its presence there is due to the fact of heating, or something of that kind, that heating is the prime cause. Our bacteriologist has not been able to recognize any specific microbe yet, and he has found something there that he can not account for, and when I left him he was still working upon it.

Mr. Harrison: You find that on the fruit still on the trees, do you not?

Prof. Taft: Yes, sir. Mr. Harrison: How could it be heated, then?

Prof. Taft: Well, it might be. For instance, we had warm, moist weather along through August, on several occasions, long continued, and it might be that, of course, on the tree the same as in the barrel.

Mr. Sherwood: I have noticed particularly that we found it on the fruit on the trees, before it was put into the bins. In reference to Mr. Smith's method, it was found more noticeable on the top of his bins than it was on the bottom last year. I drove nearly a mile to see the effect of it, and nearly every apple we found in the Baldwin bin was affected, but there was more trouble on the top of the bin than there was on the bottom; so that this is not what Mr. Harrison refers to, because it has been noticeable on the trees before the fruit was put into the bins; and so far as I could see it did not increase any after putting into the bin.

Prof. Taft: Were those spots on the outside of the fruit?

Mr. Sherwood: Yes, sir. It is the same as we find on Jonathan.

Prof. Taft: What I have in mine were in the inside. I never saw any on the outside at all.

Mr. Morrill: There is an idea which develops in this discussion that I would like to bring out here. Now, I saw Mr. Sherwood's apples when he was packing them, and remember that they were diligently sprayed previous to the opening of the leaf and on to the close of the spraying season; they were thoroughly taken care of; they were clean apples when put in, and they were put in areas as large as this room, in two and three (and I don't know but four) large piles, and I saw in there a great number of men packing those apples, and they were coming out of the bottoms of those deep piles in perfect condition. Now, I ask Prof. Slingerland if that crop of apples had been affected with scab of these various sorts, knowing it to be a contagious disease and casting off spores, if under the heating process that takes place there, if it would not be possible for the apples already contaminated to give the disease to the others and for it to grow. It occurred to me it is possible for something of that kind to take place, and it might make a great difference whether you put clean apples in contaminated with these contagious troubles.

Prof. Slingerland: I think the heating and moistening conditions would tend to make a fungus grow more readily, and whether that fungus would send off spores or not, I would leave that to Prof. Taft. I think he knows more about that than I do.

Prof. Taft: I really could not say, definitely, as to that point. I am very sure the seab will grow in the apples if it is hot and moist—the spots will enlarge in the apples.

Mr. Cook: For a number of years, commencing, perhaps, after the cold winter of 1873-4, when so many of our apple trees were injured by cold, I have been in the habit of collecting fruit for exhibition, about our county, for the fair, in connection with some other gentlemen. We began to discover in those years this bitter rot in Baldwin, more particularly, and I recollect one orchard which was seriously injured. It was almost impossible to secure specimens of the Baldwin that were not troubled with bitter rot, on the trees, and we found it more prevalent all through the country after that weakening of the trees by the cold winter. How that affected it specially I do not know, but that is what we found.

Mr. VanAuken: I would like to ask the gentleman a question. What is the width of the boards he uses in making the cribs, so that the apples may get full circulation? Mr. Smith: Eight inches.

Mr. Sherwood: There is a question that has been discussed a great deal in our papers, and it is a matter of observation with us all, and Mr. Harrison, a practical man here, says that apples sweat. Is that a fact? Mr. Smith: No, sir.

Mr. Sherwood: It brings out a question in my mind which is a very important thing. I think apples, when they do "sweat", lose much of their flavor, and we run the chances of their decaying more than when they do not sweat. It is my belief (I may be mistaken in it) that if the temperature is held evenly there is no necessity of their sweating. If you take an apple from the tree and keep it as near that temperature as you can, it will not sweat. The old idea of apples sweating I do not agree with myself.

Mr. Morrill: Would you call it condensation? Mr. Sherwood: Yes, sir.

Mr. Harrison: I suppose it will be admitted that apples in barrels, too closely confined in the hold of a vessel, will heat, if they will not sweat, and I do not think you can get that heat without there being an emanation from the fruit; and I think, if you pile apples high in a bin, you will find much the worse fruit is on the top where the emanations ascend from below.

Mr. Stevens: I would ask Mr. Smith at what temperature apples should be kept to keep them from sweating?

Mr. Smith: This fall the cellar was closed entirely while I was packing the apples upstairs, and when we had finished barreling we opened the cellar in order to begin to pack down cellar. When the doors were opened the apples were all dry. Admitting the warm air from outside, the cold apples inside condensed the moisture, and so far as the air had access, and no further, it moistened the apples.

Mr. Taylor: Covered with dew?

Mr. Smith: Yes, sir. A pitcher full of cold water, in the summer, when the pitcher is colder than the atmosphere about it, "sweats", and that is the way apples sweat. There is no sweating if temperature of apples and air be equal.

Mr. Morrill: I do not know as this discussion will be very profitable, because the facts exist, and we all know they exist, though we do not know, perhaps, what there is of it. In my opinion both are right and both are wrong. Under certain conditions the moisture in the atmosphere will condense upon an apple, and we know that under certain conditions of ventilation the apple shrinks; it shrinks by evaporation, because none of the drier solid matter leaves the apple, it is all there. You may call it evaporation, or sweat, or perspiration, you may call it whatever you please, but they do sweat and they do condense moisture under certain atmospheric conditions. I do not know that the topic is profitable at all, but these are the facts and we should understand them.

The Secretary: Yes, but when the apple is withered you do not find this accumulation of moisture; it remains dry. Now, the sweating process, as commonly understood, occurs through the practice of a great many farmers who pile their apples under the trees and leave them exposed to all kinds of weather, under the impression they will keep better if allowed to "sweat" there. Somebody asked the question at what temperature they should be kept to avoid that. There would be no particular temperature. Any time when the atmosphere warmed up by a sudden change, and it was humid, and the apples were of lower temperature, this sweating would occur, but the precise degree would not be fixed. There would be no sweating through the evaporation of the apple, no perceptible moisture on its surface. It is a popular error, no doubt, that apples are benefited by this sweating process out under the trees, exposed to the rain and frost and the other conditions of the atmosphere. When this sweating has occurred, these apples are very unpleasant things to handle, and certainly will not keep better than if they had been put away dry.

Mr. Rork: We have noticed in roots—turnips, carrots, and potatoes (and the keeping of them seems quite similar in conditions to keeping of apples)—that if put deep into a hole and covered tight at once, they will gather moisture and rot; and if you put them into a hole and put a heavy blanket over them, and let them lie there awhile, the blanket will be wet through, a blanket as heavy as a carpet. After that you can take off the blanket and cover them, with a degree of safety. Now, the temperature, after you have covered them with a blanket and put them into the hole, is certainly as warm in the hole as it is outside, and yet they will continue wet. I have put apples away the same way, put them into a hole and covered a blanket over them and the blanket was wet. If you put earth over them they will rot soon. If you let them stay there and remove your blanket, you can leave them with a good deal of safety.

Mr. Morrill: Those of us who have paid any attention to cold storage know this, that the least possible change or variation in temperature is the best condition in which to keep apples, and with perfectly uniform temperature this sweating or condensation is scarcely noticeable; and that the best temperature in which apples can be kept is from thirty-four to thirty-six degrees. These are things which we should understand, and the nearest approach to that is the nearest to perfection, and the temperature should be held absolutely uniform. This might bring

us to the question of cold-storage houses. You can not find an ice-house in Chicago that can get eggs or apples or butter, on account of the fact that they are not perfectly reliable in their temperature, while the chemical houses as they are called, are the successful ones. A variation of a degree to a degree and a half will affect the apparatus, and such change will close or open the flow for that particular room, regulated by the thermostat, and these houses are keeping apples successfully. They go in and come out sound after a long period. There is no method that is equal to this, because the apples are placed in a room that is set at thirty-five degrees regulated by the thermostat. You know it will never be below thirty-four degrees nor above thirty-six, and it will stand there the year around. Something was said about the expense of cold storage. Some of the best houses in Chicago are stowing at ten cents per barrel the first month and five cents for each additional month. The trouble has been, this year, to get room—it was all contracted for early.

Mr. Willard: I would like to ask Mr. Sherwood if he attributes his success in having continuous apple crops to his culture or to his spraying?

Mr. Sherwood: I attribute it to both. I think that it is impossible to have successful apple culture in western Michigan without spraying and without thorough culture, and clean culture, and fertilizing. I have done that in my orchards, and have given a thorough fertilizing with barnyard manure and mulching and turning under and pasturing with sheep, and am now pasturing with hogs, which I think is the best method we have; it is the most satisfactory. I attribute my success to it. I am young in the business, comparatively, and my experience has been based on observation and comparison. There is an orchard right next to my orchard. Mine has borne four crops and that has borne one—the same soil, practically the same, the same trees, and set the same distance apart, trimmed alike; but that orchard was in sod and hadn't had the cultivation and the spraying that mine had. I think that we can not emphasize spraying too much.

Mr. Bos: Then I understand you prune just as much? Mr. Sherwood: Yes, sir, thoroughly.

EXPERIMENTS WITH ORCHARD COVER CROPS.

BY PROF. JOHN CRAIG OF OTTAWA, ONTARIO.

Suitable cover-crops to protect orchards are of great importance in all fruitgrowing sections. In northern regions, the practice of sowing a crop after cultivation ceases, that will at once enrich the soil and protect the feeding roots of the trees, is one of the essentials to success, and an item in the annual programme of orchard management that should never be omitted. The late P. C. Dempsey of Trenton, Ont., one of Canada's most successful fruitgrowers, recognized the truth of these statements years ago, and frequently expressed himself to the effect that a cover-crop of weeds in the autumn was far better, considered in the light of what was best for the trees, than no cover-crop at all. The healthy and profitable orchard of apples and pears which he left to his worthy son, W. H. Dempsey of Trenton, furnishes ample proof of the benefits of the system.

In brief, this means sowing a crop in the orchard after cultivation ceases in summer, that will protect the roots of the trees by preventing at once alternate freezing and thawing and deep freezing; that will add something (the more the better) to the fertility of the soil when turned under; that will improve its tilth or mechanical condition, and, lastly, that will occupy the ground to the exclusion of such plants as may wander out of place—weeds.

When soils, especially those of a clayey nature, are constantly cultivated without being subjected to the ameliorating influences induced by producing some kind of vegetation, not only do they become mechanically unsuited for the production of healthy and vigorous plant growth, but the plant food may take on forms not readily assimilable. In northern sections, perhaps one of the strongest reasons that can be urged in favor of the practice is the protective influence cover-crops exert against the often severe root injury wrought by sharp frosts to trees growing upon bare soil. Speaking of injury of this kind, Prof. Hartig of Germany says:

"Roots of all young trees, even forest trees, may be killed if severe and long-continued frost finds the lighter classes of soil unprotected by snow or any other covering. The periderm of the root is thinner than that of the stem, and consequently the former is less protected; and, moreover, growth is active for a longer period in roots than in the twigs. When, in mild climates, growth continues till the middle of winter, when frost occurs the tissues are not in the inert condition which assist them to resist cold, and death to the affected tissues follows. Such plants burst their buds in spring but wither whenever transpiration from the delicate young shoots has exhausted the stock of water."

An occurrence of this kind may wipe out in a single winter what was a promising young orchard. As the trees grow older and become deeper rooted, the danger naturally lessens. Portions of the central experi-

mental farm cherry and apple orchard, at Ottawa, upon light soils, under clean cultivation, were almost totally destroyed in this way last winter. The temperature fell, and remained more or less stationary at twenty degrees below zero, for some days toward the end of December, when the ground was entirely unprotected by snow. The cherries were mainly root-grafted or budded on Mahaleb stocks; the apples were budded and grafted on French crab stocks. The character or variety of stock seemed to have less to do with the extent of the injury than the nature of the soil. In those portions of the orchard where a hard and impervious subsoil approaches the surface the injury was greatest. The twigs and branches retained their plumpness till the commencement of the vegetative process; the flower buds, with which the trees were thickly covered, opened or partly opened, as the case may be, and in some instances fruit set; the leaf buds usually made an attempt to do their duty, but failed to more than half develop leaves. By this time the twigs were much shrivelled, and, the store of food having become exhausted, the trees gave up the struggle and died. On digging them up it was found that in nearly every instance the upper system of roots was entirely killed, and while the lower or tap roots were alive toward their lower extremities, the superior portions were entirely killed. A lesson of this kind need only be learned once, and strongly emphasizes the desirability, if not necessity, of protection, from that standpoint.

In 1895 a number of plants were tried with view to ascertaining some facts regarding the advantages of each in this climate. Half an acre each of the following fodder plants was sown, Aug. 15, with a light seeding of rye at the rate of one and a quarter bushels per acre:

No. 1. Crimson clover	20 lbs. per acre
No. 2. Mammoth clover.....	12 lbs. per acre
No. 3. Alsike clover.....	12 lbs. per acre
No. 4. Alfalfa	15 lbs. per acre
No. 5. Common red clover	12 lbs. per acre
No. 6. White clover and orchard grass.	
No. 7. Common clover and orchard grass.	
No. 8. Peas.....	2 bushels per acre

The following notes show the condition of these late in the autumn and early in the spring:

Plants.	Condition.		Remarks.
	Fall, 1895.	Spring, 1896.	
1. Crimson clover-----	2-4 inches high, smothered by rye; light covering by first frost.	Entirely killed out; no plants to be seen May 12.	Smothered by the rye.
2. Mammoth Red clover.	2-3 inches high; weak; ground fairly covered by rye.	Light cover; best where unprotected by rye.	Fairly good.
3. Alsike clover-----	2 inches; very light covering; poor catch.	Wintered well; fair cover where alone.	Fairly good.
4. Alfalfa-----	6-8 inches; good catch, showing well through rye; tops killed by first black frost.	Wintered well on low ground; killed out on knolls.	Good.
5. Common Red clover.	Very weak; nearly crowded out by rye.	Badly killed; very light cover; patchy.	Too weak.
6. White clover and orchard grass.	No improvement over the last.	Killed out.	Too weak.
7. Alsike clover and orchard grass.	Better than last: cover light, but fairly even.	Light crop on low ground.	Too weak.
8. Crimson clover and orchard grass.	Crimson clover weak; orchard grass makes good showing.	No clover; orchard grass makes some show.	Too weak.
9. Field peas-----	Nearly crowded out by rye.	Only rye left.	Smothered by the rye.

Summing up the conclusions, I would say: (1) Rye sown at the rate of one and a quarter bushels per acre proved too thick for most of the clovers, and prevented their full development; at the same time it should be remembered that it furnished a certain amount of protection and gave a certain amount of plant food when turned under. (2) The seeding down took place about one month too late to secure the best results in this locality. (3) The best cover obtained was given by (a) Alfalfa, (b) Mammoth Red clover, (c) Alsike clover and orchard grass.

Upon the same piece of orchard soil as that used in 1895, one acre each of the following cover-crops was sown July 13, 1896. These were seeded alone, lightly harrowed, and rolled:

Crimson clover.....	20 pounds per acre
Mammoth clover.....	15 pounds per acre
Alfalfa clover.....	15 pounds per acre
Common red.....	12 pounds per acre
Soja beans.....	60 pounds per acre
Cow peas.....	2 bushels per acre

Crimson clover appeared in five days, even, fairly strong; Aug. 12, three inches high, covering ground fairly well; strongest in partial shade; Oct. 14, strongest plants 15 to 18 inches; on lighter and poorer parts, plants were rather weak.

Mammoth clover appeared rather sparsely in six days; Aug. 12, growth moderate, weeds, principally purslane, taking possession at first Oct. 14; strong, even growth throughout; average twelve inches high, giving a close, heavy covering.

Alfalfa came up in five days, a remarkably even and strong catch; Aug. 12, eight to ten inches high, completely covering the ground; Oct. 14, knee-high, very uniform; growth strong, even on light sand.

Common red appeared unevenly in six or seven days; Aug. 12, two to three inches high; ground partially covered; Oct. 14, 6 to 10 inches high; rather thin here and there; not heavy enough.

Soja beans appeared promptly and evenly in five days; Aug. 12, plants 8 to 12 inches high, vigorous; Oct. 14, quite black and leafless; killed by first frost; ground practically unprotected.

Cow peas germinated evenly in five or six days; about right as to quantity, making strong growth; Aug. 12, plants 10 to 12 inches high, nearly shading ground; Oct. 14, exactly the same condition as soja beans.

Information to be gained by the condition in which the different crops come through the winter is necessary in order to arrive at satisfactory conclusions. From present appearances, Mammoth clover seems to furnish a cover which, if not ideal, yet appears to be such as to place it among the most useful of the available plants for this purpose in this locality. Alfalfa has certainly done well, and I believe could be used with advantage on sandy or gravelly soils. Crimson clover grows rapidly and forms an excellent cover, but our experience shows that it is unreliable, and this experience is corroborated by that of the best fruit-growers in the oldest portions of Ontario. As for cow peas and soja beans, they are not equal in the colder sections for cover-crop purposes to common field peas.

A deep-rooting plant with a leafy habit of growth, owing to the necessities of the case, is desirable; also a plant that will add to the fertility of the soil when turned under. The beneficial effects of green manuring is clearly explained by the chemist of the experiment farm in the following language (Report 1895, page 210):

"By the acid exuded from the rootlets, by the carbonic acid of the atmosphere, and by other means, plants are enabled to make use of much of the mineral matter of the soil. This is stored within their tissues, together with water and organic matter, the latter being derived in the gaseous form from the atmosphere, and elaborated by the leaves. The turning under of a green crop, therefore, supplies for succeeding crops a store of readily digested plant food—of potash, phosphoric acid, and nitrogen. In addition to these essential elements of fertility, the decaying organic matter from the turned-under crops acts beneficially in conserving the soil's moisture, a most important matter for light and gravelly soils. Further, the presence of this organic matter serves to regulate the soil's temperature, and its decay brings about the solution of inert forms of plant food already present."

"Buckwheat, rye, and clover are the principal crops used for green manuring. Buckwheat has been found very useful, as a growth may be obtained on comparatively poor soils, soils that in the first instance would not support a growth of clover, and undoubtedly both it and winter rye, when turned while green, vastly improve many soils. The legumes (clover, peas, beans, etc.), however, are still more valuable, inasmuch as they not only furnish a supply of readily digestible food obtained from the soil, but add a store of nitrogen derived from the atmosphere. It is owing to this power of atmospheric nitrogen-assimilation (which takes place by the agency of certain micro-organisms in the tubercles on the rootlets) that the legumes have been termed 'nitrogen collectors' in contradistinction to all other plants, which are classed as 'nitrogen consumers.' The legumes appear to be richest in this element at the period of flowering, a fact which suggests this time as the best time for plowing under the crop."

The following table shows the calculated amount of Crimson, Mammoth, Common Red, and Alfalfa clovers per acre, upon the surface of the ground just before the period of killing frosts in the autumn. [The calculations are based upon chemical analyses, a square yard of each crop being used as a basis.]:

Plant.	Weight green material in pounds per acre.	Weight of roots in pounds per acre.	Per cent water in stems and leaves.	Per cent dry matter in tops including stems and leaves.	Total pounds nitrogen per acre estimated on per cent found in green material and roots.
Crimson clover-----	22.234	6.201	83	17	104
Alfalfa clover-----	11.492	10.587	72	28	136
Mammoth Red-----	13.310	7.260	79	21	130
Common Red-----	9.528	5.445	76	24	117

It will be seen that Crimson clover gave the remarkably heavy yield of ten tons of green material per acre. It will, however, also be noticed that the percentage of water is considerably higher in the green material of this variety than in that of any other; also that the weight of roots is comparatively low. Among other striking points which may be noticed, is the large weight of root material furnished by the Alfalfa, owing to which this plant ranks first in total yield of nitrogen per acre.

There is little to be said in favor of soja beans or cow peas as cover-crops for northern localities. They grow rapidly, produce a considerable amount of foliage and vine, but are cut down by the first light frosts, in autumn. Apart from their office as collectors of nitrogen, they do not seem to furnish as much surface protection as buckwheat or rye, and certainly not so much as field peas.

Examining the values of the four clovers from the standpoint of the approximate amount of nitrogen returned to the soil, per acre, we find, by assuming that 70 pounds or two thirds of the nitrogen in the tops and roots of the Crimson clover came from the air, at fifteen cents per pound it would have a fertilizing value from this source alone of \$10.50. The tops, leaves, and roots of Alfalfa would give about 124 pounds, which,

multiplied by 15 for the value of each pound, gives the large sum of \$13.50 as representing its value as a nitrogen collector.

Common Red clover would yield \$11.70 worth, being slightly ahead of Crimson clover. It has a larger percentage of root material and more dry matter in the stems and leaves than Crimson. Mammoth clover would stand next to Alfalfa in value of nitrogen from the leaves, stems, and roots, with \$13.00 approximately to its credit.

Alfalfa or Lucerne is a plant of slender, upright growth, and does not branch much if uncut. It does not, therefore, furnish as much leafy covering to the surface of the soil as is afforded by the same number of plants of Mammoth clover, which stool out better and are naturally more branching in habit of growth than the straight-stemmed Alfalfa clover. This plant does very well on sandy soils. It seems able to penetrate the hardest subsoils and maintain itself where Crimson clover would make a very weak growth.

Crimson clover will, I fear, in this locality, serve only one of the ends for which it is sown, viz.: that of keeping down weeds and adding to the fertility of the soil without protecting it very much during the winter. It is possible that selected strains of Northern-bred-seed may be produced that will give plants capable of withstanding the severity of our northern winters. A desirable field for patient and painstaking work presents itself in connection with this. On light and poor sandy soil this variety makes a very weak growth.

Common Red clover possesses no advantage over the Mammoth Red, and is a weaker grower.

Mammoth Red clover, I am of opinion, will prove the most satisfactory cover-crop for all the apple- and pear-growing sections. Good seed germinates promptly; the plant soon takes and holds possession of the ground to the exclusion of weeds; it is fairly deep rooted; covers the ground with a good mat in the autumn, and begins to grow at a moderately low temperature in spring. A block of six acres of this clover, sown July 10, in one of the apple orchards, had produced an ideal protective covering when covered by snow this autumn. The best kind of cover-crop for one section may prove quite unsuited to another section differing from the first in soil and climatic conditions. Not only is this true, but it should be remembered further that the peculiarities of each class of fruit should be carefully studied before the orchardist decides upon his method of procedure.

DISCUSSION.

Prof. Craig: Now, I have put a chart up here to which I would like to draw your attention. It is just to emphasize the fact that while the tree is growing the amount of nitrogen, phosphoric acid, and potash which it draws from the soil are more or less equal, but as soon as that tree comes into bearing the amounts of these fertilizing materials drawn from the soil vary a great deal. You will see on the chart at the top, under references "nitrogen, phosphoric acid, and potash", at the end of each, small dots. Now, those dots are comparative. They show the amount of nitrogen which the leaves take from the soil, as compared with

phosphoric acid and potash. This is all, we may say, before fruiting time. When that tree comes into bearing, the lines below indicate the relative amount of these materials used in producing fruit. You will see there a line about a foot long, of green, representing the amount of nitrogen, about eight inches of phosphoric acid, and some three or four feet of potash. This brings us back to the old question of the necessity of applying potash to the soil when the tree is bearing fruit. This chart is based on actual chemical analysis made by our chemist at the station. Therefore it appears to me we can give to the fruiting tree, or the growing tree, all the nitrogen it may need by growing such leguminous crops as I have mentioned in this paper. I am now inclined to favor Mammoth clover. We can balance the ration by adding, in the form of commercial fertilizers, phosphoric acid and potash, and by following this practice there should be no difficulty in protecting our trees from root-killing, at the same time giving them the necessary amount of food rations in a well-balanced form.

The President: This particularly applies to apple orchards, does it not?

Prof. Craig: Yes, sir.

The President: The people of our state are a little more exercised to find a good soil-covering, for peach orchards, and we believe it is not necessary to hunt for nitrogen, as a rule, in our peach orchards; that is, to put nitrogen catch-crops on, as a rule.

Mr. Lyon: I would like to ask Mr. Morrill, because I understand he uses potash extensively, and wood ashes, where he gets them; and if not, when he uses a substitute, what it is?

The President: I hope that President Lyon will not insist upon my telling him just exactly where I get them, because there is a whole lot of places around here that want wood ashes. I get them from Indiana, in carload lots. I have never tried any substitute yet, for ashes, because I like that form of potash best.

Mr. Ramsdell: How much do you put on to the acre?

The President: About a hundred bushels every other year. If I happen to get a surplus, I go over the orchard twice per year, and I have an idea that the potash does not get away from me; that I will find it there in the course of time.

Professor Craig: What was your question, Mr. Morrill?

The President: Whether we should pay so much attention to hunting for a nitrogen crop in our peach orchards as you lay stress upon here in apple orchards? Nitrogen is conducive to late growth, and we are a little afraid of it.

Prof. Craig: I do not think, in growing a clover crop and securing from it the amount of nitrogen which Mammoth clover might give you, that you would run any danger of getting too late a growth. I do not think we should lose sight of the fact that we are always using up nitrogen in the production of all fruits, as in the case of apples. You will see it comes next to potash in importance, upon the chart, and I do not think, myself, that you would run any risk at all. Of course, in using wood ashes you get two per cent. of phosphoric acid, or one and one

half per cent., according to our analyses. I should think it quite a safe practice to use clovers.

The President: Have you tried oats?

Professor Craig: No, we have not tried oats.

The President: The Professor failed to tell us when he plows his clover.

Professor Craig: Plow it under in the spring. Our plowing usually takes place before the 15th of May; we are somewhat later than you are here.

Mr. Weed: Will any of these clovers grow in ground that is shaded by the foliage of the tree?

Professor Craig: This ground is not shaded. The trees are ten years old and thirty feet apart, so that you can get an idea of the amount of shade we had.

Mr. Post: In our section of the country we find it necessary to continue cultivating, especially if the season is dry, and in an orchard of late varieties of peach we consider it necessary to cultivate later than the middle of July. How are you going to overcome this? If you seed down you will have to discontinue cultivation. I am talking about peach orchards.

Mr. Sherwood: I would like to ask if this question would apply to seeding of peas sown in the spring; if you would get the same results, that is, as much of the chemicals, in the soil? Of course, it would not act as a cover crop.

Professor Craig: Quite as much, probably more, because the season would be longer, and these organisms work just as long as the season allows them. At the same time, a crop sown in the spring would take more moisture from the soil than you would want, and in sowing late I would sow the variety that would make as rapid a growth as possible, and in that way I would favor sowing peas. I have had no experience with oats at all, but field peas, or perhaps soja beans, something that would grow rapidly, would serve the same purpose, and have the same function. I can see the force of Mr. Post's remarks, in localities that are likely to suffer from lack of moisture.

Professor Taft: I would say that we have been trying a combination that so far pleases me very well. We have for several years been growing Crimson clover, and I think it will, in ordinary years, stand very well. Still, we have in some years lost the entire growth during the winter, or perhaps I might say a great harm is done in March or April, as a rule; and particularly where there is a slight ridge or knoll, any inequality, we generally lose from the rounded surface of the land at that point; and in a measure to do away with this trouble I have several areas sown this way, with Crimson clover and oats, as well as the clover alone, and from present appearances I look for good results, from the fact that where we have a slight snow fall, as we have had an inch or two once or twice this fall; at Lansing, I find that in the oats the snow is held evenly over the surface and the little ridges are well covered, whereas on the bare ground, or where there is only the Crimson clover, it has blown off a good deal more; and more than that, leaves fallen from the trees are held upon the surface. The oats were sown at different

times. We commenced with the clover first on a small area, about the 15th of July, and seeded at intervals, sowing the first of August another tract of about two acres with Crimson clover and oats, and still another about the middle of August; and the oats made a growth of nearly two feet, averaging perhaps very close to two feet, and of course are now somewhat killed back, the tops have dropped down, and I think they will now stand a foot high over the ground, probably more than that, and they will certainly hold the snow evenly and protect the Crimson clover. Of course, there would have been danger in sowing a larger amount of seed of the oats, hence we cut it down to a little less than a bushel, and we found that occasional broadcasting of the seed left it a little uneven, and it might be too thick in certain spots, although it was really very even, and there we had a thick growth of the clover; and over nine tenths of the area, where we used more than three pecks of oats, we had a very good stand of clover, and I think it will remain.

The President: How much clover did you use?

Professor Taft: We used eight pounds to the acre. I cut it down, also, and I have a tract of three acres sown with seed of the fourth generation grown on our own ground, the fourth crop that we have saved ourselves continuously, from the original purchase, and from the past years I think I can see a gain in its hardiness. This year we have been cleaning it up and I just took the chaff with the seed in it, after we had cleaned out what we could, and got a very thick stand from that.

Mr. Hamilton: The professors do not appear to help us out a great deal. With us we can not sow as early as July and August. We have to be in our orchards and do our picking after that time. We want something that we can sow the last days of October or some time in October.

Prof. Craig: You will have to get an extension of the season then, won't you?

Mr. Hamilton: That is what we find in actual experience. We have to be in our orchards from the 1st of August until the last days of October, and in a way that I think we could get very little growth of anything, especially on our heavier soils. It would be tramped out. I think it would be impracticable for us to sow early and get a growth. We must have something that we can sow in October, to help us, and on our younger orchards we can sow Mammoth clover, and I think to good advantage. I seeded, last fall, after the first rain, Mammoth clover in my corn in a young orchard, and I have a covering now thick and nearly a foot high, and that I calculate to turn over next year. We can not do that with our bearing orchards. We have to cultivate early, and up to the time the professors talk about sowing, and then we have to pick.

Mr. Stearns: I seeded the greater part of my orchard this year, about the middle of September, with Crimson clover and oats, using about a half bushel of oats to the acre, and I have a good stand of Crimson clover and oats all over the orchard, and it is an orchard where I have been harvesting pears and peaches right along since the clover and oats were sown, and with no great detriment to either.

Mr. Hale: Right along this particular line it has been my custom, in my orchards and in fruiting orchards, to seed with Crimson clover the middle of July, or at the last cultivation of the orchard. It is in a

high state of fertility for the peaches, and if the weather is favorable as to moisture, it comes up readily and makes a very good mat before we are ready to pick peaches, and makes a cleaner and better orchard to work in. We tramp it down, of course, a great deal, in gathering the crop, and prevent its making much headway or growth. As soon as the crop is off in the latter part of September, the ground is harrowed over lightly, with a smooth harrow, and oats or rye put in, and then we get a good growth that starts up the clover, and we get a good growth of one or the other, and there is no trouble about that. Our friend who objected to Prof. Craig making his seeding so early, because it prevented cultivation, can readily get around that by sowing such crops as can be put in with drills. You cultivate and stimulate a more rapid growth of the catch-crop, whatever it may be, at the same time give the cultivation to your orchard as late in the season as you care to do. I do that with cow peas and soja beans particularly.

Mr. Post: Mr. Stearns rather got the start of me there. I have been experimenting the last two years with Crimson clover and oats, and I get the best results from sowing even a small quantity of oats. I sow about the middle of September for the best results, and this year my plum orchard was very heavily loaded. They were tramped until I thought the crop was ruined, but now you see very little difference between where it was tramped and where it was not. It came on very nicely and the crop was not killed. The Crimson clover and oats were sown about the middle of September, with about a half bushel of oats, and the clover and oats are both looking very nicely now, but I think the prospect is better where the oats are, and better yet where they were sown very thinly.

The President: We have some neighbors down our way who of recent years have commenced using oats alone, and they report excellent success with them in peach orchards. Now, my own opinion is that the less green stuff there is in an orchard in the spring, when I commence working it, the better it suits me. Most of us find, if there is anything green drawing upon the moisture of the soil, that the last plowing may find it pretty well drained out; that is, the tree may be needing the moisture that we have already taken out; while the oat crop is dead, it has served its purpose of holding leaves, and leaves the soil in better mechanical condition; then it is easily turned under, there is no evaporation of moisture to amount to anything, and the soil is in prime condition. Rye has been tried quite generally, and almost invariably before we get the last of the rye plowed under the tree is injured and shows it through the season, by the drawing out of moisture at a time the tree is calling for lots of it.

A Member: How much oats do they sow, and when do they sow them?

The President: I think the neighbors that I have in mind are sowing a bushel or a bushel and a half of oats, sowing them in August or September, and doing whatever work is necessary on top of that crop, and it seems to succeed very well.

Mr. Shriver: I have been sowing oats now about three years and I like it. We sow them in August and we do not find any bad results from tramping over them and picking the fruit. I think we sowed about 300

acres of oats and they stand up from six inches to a foot high now. They hold the snow and leaves, and especially on clay ground it loosens it up. You do not have any baked ground the next year when you cultivate it.

The President: Does it prevent the ground from washing any?

Mr. Shriver: It keeps the ground from washing and the snow from going away. It holds the leaves, and in picking the fruit in the fall it does not seem to hurt oats to tramp over them. This fall we sowed all our ground with oats; it costs about seventy-five cents per acre. We have a thick growth. This year it has been a much larger growth than we had other years, on account of so much rain this summer; they got a better start. We like it.

Mr. Hale: There is just one point I wish these gentlemen would tell us, and that is, what advantage crops of this kind have over the crops that do gather nitrogen? What advantage do oats or rye have over the clovers?

Mr. Shriver: I would say for the oats, they hold the snow, keep the ground from washing, keep the soil moist, and then in the spring the ground is mellow and nice for working; while, if you take clover, you can not get any such size in that time, and have to take a year or more. Rye you can not get large enough in the fall, and then, as Mr. Morrill says, we can not get rid of it in the spring in time to give the most good. Oats die down in the winter, and in the spring you can even take a disc harrow and go over them, and you have the ground in good condition, or you may use a shovel-plow. I have tried it three years in my pear orchard, on a piece of clay which used to be one of the hardest pieces of ground in the neighborhood, and now it is one of the mellowest pieces of ground, as nice as any sandy soil we have.

Professor Craig: It seems to me that the Michigan fruitgrowers are in very happy condition; they are going to apply Canada wood ashes and grow oats on peach ground, and their trees do not need any nitrogen. I have no experience that extends over more than three or four years. Now, I would not have you forget that a day of retribution may come, and that if you are constantly taking nitrogen out of your soil and not growing anything to put it back into it, there may be a day of reckoning. You may find that oats is a good cover-crop, but I would strongly advise you not to tie yourself down to oats, and possibly not to clover, entirely; but if you find it desirable, then alternate the two—put oats in one year and clover another year, or mix them, as Professor Taft has suggested; but you certainly can not get along without having a certain amount of nitrogen in your soil. I do not think there is any soil, even Manitoba soil, which we boast about a good deal, that is rich enough in that constituent to stand continuous cropping without returning nitrogen in some way. I may say that our Ontario growers find it necessary to sow clover about the first of August. Their season is two or three weeks later than ours at Ottawa, and they find it desirable to sow clover the first of August, or some other crop at that time, in order to take up the extra moisture in the soil, so that the tree may ripen its wood perfectly. I refer particularly to the peach. Your conditions may be so different here as not to call for that kind of treatment.

The President: We take the moisture out with peaches.

Professor Craig: As Mr. Morrill suggests, your peaches take all the moisture out that the soil can stand. Well and good, but still I think you should not forget that nitrogen is necessary to the well-being of the peach tree and of the soil.

Mr. Rork: I do not see why some of the gentlemen prefer Crimson clover to the large Mammoth clover. They speak of sowing Crimson clover in with their oats. In sowing, as we have seen already here, it does not make any more rapid growth than the other, and why do they prefer Crimson clover?

Mr. Post: The reason is, it starts very much earlier in the spring. We sow oats for the sake of protection.

Mr. Rork: If it starts at all.

Mr. Post: It starts, if you have that protection, the oats; that is why we sow the oats.

Mr. Rork: Most of the gentlemen speaking are on clay soil. A good many of us are on a light, sandy shore soil, and there is a wide difference.

Mr. Post: I think that theory would apply to sandy soil. We use it on sandy soil.

Mr. Rork: We must have something that enriches, and I think I am not so afraid of the barnyard as some of you are, not by any means, on sandy soil, and the oats, it seems to me, do not enrich us much; and then we find the trouble is, if we wait until along in midsummer, the hot, burning summer, we can hardly get anything to catch. When it gets along toward fall, your warranty deed does not hold it all still, and your stuff whips right out. As soon as the latter summer and fall winds begin to blow, you are on the hoist, and must be held down; and there are some of us who commenced empty-handed who find that something is better than bare ground. While oats grow quickly and hold the soil down, when we wish to get them up again, they do not get up, when the spring comes, and the clover does not get rooted enough, and we turn it under in the spring and it does not benefit us much. So there we are. We find it pretty hard to get a cover-crop to grow on our sand, and stand the winter and be ready for something in the spring. We simply have to have something that makes us richer.

Mr. Post: One of the most successful growers in our section of country does not use cover-crops at all; he uses barnyard manure instead, applying that around the trees; he covers the entire surface, and in the spring he works it in with a cultivator or a cut-away harrow, but he covers the ground with coarse material.

Q. Are you talking about a peach orchard?

Mr. Post: Yes, sir, a peach orchard, and he is very successful and has been for years.

FUTURE OF PEACH-GROWING IN THE UNITED STATES.

BY MR. J. H. HALE OF CONNECTICUT.

I was not sure whether the topic for discussion this afternoon was the future of peach-growing in the United States, or Michigan, or what, and the first thought that came uppermost in my mind, when thinking about talking to you and with you on this subject, was whether it really referred to your future or mine, or the general future of the business in this country. I have made a few notes of some points that I wanted to talk upon, and, while I have those notes with me, I don't suppose I shall use half of them and shall use a good many others that come along, because you and I have found in peach-growing that we learn and unlearn things almost every day; and while I am here to talk to you today about what I believe and know and understand of fruitgrowing at the present time, and believe of it in the future, I am frank to say to you that there is not a thing that I believe today that I will promise to believe tomorrow or next year, and it seems to me that you must reach this basis in order to keep up with the procession.

It is hardly well to talk of the peach-growing of the future without considering something of the past and of the present. Peach-growing twenty-five years ago was confined to a few states and a few particular localities, and the men who were so fortunate or so unfortunate, as the case may have been, as to live in those regions, planted peach trees and took whatever results came therefrom; but within the last ten or fifteen years the work of horticultural societies and experiment stations and progressive fruitgrowers has gone on at such a rapid rate, the building of railways into new sections of country and the consolidation of lines whereby through trains run over two or three different roads to make quick time from far distant points to your markets or mine, have revolutionized the business entirely, and now there are peach-growing regions and there are peach orchards by the hundreds and by the thousands and tens of thousands of acres in many states and sections where peaches were not known before, when twenty years ago it was your few counties here in Michigan, Maryland, and Delaware, and a few sections of New Jersey that produced the peaches of the United States.

You must wake up, my brothers of Michigan, to the fact that there are many other sections that can grow as good peaches, that there are men there trying to grow better peaches than you can grow. Beginning in our Atlantic coast states, Georgia has developed within the last eight or ten years a planting of many millions of trees; sections of South Carolina are up in the hundreds of thousands; sections of North Carolina are fast being developed; Virginia, some portions of Tennessee, Kentucky, sections of Missouri, vast sections of western Colorado and Texas are planting fruit heavily to compete with you and with me. The fact that they are a thousand or fifteen hundred miles away does not cut much figure in business; it has not in the past few years, and it is going to

cut less in the future, and we must be prepared to meet them. You will find men in some of these sections who are planting large orchards, investing large capital, either individually or in corporations, and having sharp, shrewd horticulturists to manage them, and they are studying business methods all the way through, and it is to meet such competition as that that the peach-grower of the future or the peach-grower of the present day, who proposes to carry on his work in the future, must contend. But there is one thing certain—we must wake up. The old-time methods (or lack of methods) in peach-growing must be done away with; there is no question about that. The peach is one of the most beautiful and delicious of fruits, and it is known by the company it keeps, pretty thoroughly; and the peach-grower, too, and he shows it in his peaches as quickly as he will show it anywhere else. We must wake up to the way we are heading, to what the possibilities are. But how to wake up I can not tell you in every way, but there are a great many ways.

The first thing, it seems to me, is to take an interest in our business from a business standpoint, study it in every detail as business men. Now, you have successful manufacturers here in this place, and you have successful manufacturers all over the state, and they are meeting sharp competition everywhere, and the men who are standing up to the front are the ones that are doing their business thoroughly and well in every detail and are on the alert to reduce cost and increase the quality of their product, and in every way to hold to the front. We as fruitgrowers, as a majority, have lacked that. I saw a good many Michigan peaches in the markets last year, in all of our eastern markets, and I was astonished that you dared to pay freight on such trash, that you dared to—a shrewd business man would never have dared put it in a car and ship it a thousand miles unless he had good backing somewhere.

The first thing in my mind necessary to the development of fine, perfect fruit (and that of course is the first thing toward successful management of the business) is to love the fruits and soil for their own sakes. Life is pretty short, and it is pretty precious, and it seems to me that every man and woman's time should be devoted to something that is pleasurable; that we ought to enjoy something in our labor. If a man, it seems to me, is on a farm and does not love the farm, he does not love the ground, the soil, or some of the animals that may be fed thereon, or the trees and plants that grow out of it—if he does not get a real love in close, daily contact with those things, he is out of place on a farm and he would better sell if for what he can get, and start in somewhere else and make room for a better man, partly for the sake of the other man and partly for the sake of the soil, but more particularly for his own sake. I believe every man and woman in good health (and you must have good health if you are in the fruitgrowing business because you love it) should arise to his or her daily avocation as going to some pleasurable work, something that is enjoyable—not grudgingly. In producing peaches you are making a business of it, and in making a business of it you first need to have a love of the tree itself and a love of the fruit itself if you are ever going to bring either to its highest perfection, and the perfection that it must have in the future to bring us the

greatest reward in the market. This, it seems to me, is the first condition to be considered in relation to successful peach-growing and peach-marketing in the future.

Another thing is to consider what the people of the consuming world want and what they appreciate. There is a growing appreciation among the public for finer products of the soil, all the time, and for more beautiful and aesthetic things. It happened to be my good fortune, in 1890, to have some connection with the horticultural census, which covered several phases of horticultural production, and some special inquiries were made. One was in relation to floriculture. Now, floriculture has not anything directly to do with peach-growing, but beautiful peaches and beautiful flowers go hand in hand, into the same families and into the same hearts and homes of the same class of people. There never had been a floricultural census in the United States, and so I was allowed by the chief of census to begin where I liked and leave off where I could. As Uncle Sam "paid the freight", and I wanted to get all the information I could for our horticultural friends I went deeply into it. I want to just briefly state that in 1800, so far as we could trace, there was but one commercial florist's establishment in the United States. In the next ten years there were less than fifty establishments, and in the next ten years not much more than a hundred more, and so on away down until 1860, when he had less than six hundred commercial florists' establishments. Between 1860 and 1870 they increased somewhat more rapidly, and more so between 1870 and 1880; but between 1880 and 1890 nearly 3,000 commercial florists' establishments were started, so that in 1890 there were about 5,000 of them, turning out and selling to the people more than \$12,000,000 worth of cut flowers and about \$15,000,000 worth of plants and shrubbery of various kinds, and something over \$25,000,000 was the price paid by the people of the United States, in 1890, to the florists of this country. In getting at that information, we wanted a great deal of other information, and we asked those people a great many impertinent questions, just as your local census-takers did. We asked them a great many questions about their business which it is not pertinent to bring up here at this time. The point I want to get at is that we found this tremendous increase in the demand for flowers among the people of the country, to be far in excess of the increased population and increased wealth. There were investigations in relation to educational matters and in relation to church matters, lines which show the cultivation and the refinement and the better side of the people, and we found that the consumption of beautiful flowers and plants went along with the culture and refinement of the people. Now, it would not be proper for me here at this time to state in what sections of the country, per capita, we found people using the most flowers, but it is sufficient to say that as the culture and refinement of the people had developed, so the greater increase of demand for fruits and flowers had increased. Some towns of 5,000 inhabitants, in one section of the United States, often with the same relative capital and extent as others, were buying two or three or four or five times as much of beautiful flowers. Now, what has that to do with the future of peach-growing? It has a great deal to do with it, because peaches and flowers and other

beautiful things of that kind go hand in hand, and the people who appreciate beautiful flowers also appreciate beautiful fruits. They buy them and eat them, and they must be of fine appearance and the perfection of their kind, and those people are increasing rapidly in nearly every section of our country, and their buying power is increasing, and it is to cater to the taste of those people that we peach-growers of the future must come, and the sooner we come to a realizing sense that there is a great body of people in this country, that is rapidly growing in numbers and in purchasing power, who are ready to buy only the finest productions of the orchard and vineyard, and demand that it reach them in a fresh, thoroughly ripened condition, in the neatest and most attractive manner possible, the sooner we will get our reward, and of course it is the reward we are after, in the end, although too many of us go into the business for the mere hurried-dollar or nimble-sixpence idea of getting the dollar just as easily and as quickly as we can, regardless of methods; and it usually results in getting less money than we anticipated. We need a love for the business and an appreciation of what the public wants, and then an ability to develop the fruit up somewhere near to that demand. We should not rush into simply the planting of acres, or of getting the bushels into the market, regardless of other things which are going to give us the great reward; and we have in the past slipped up on that dreadfully.

Some one was telling me, within your own state, within a month, that he thought (and he was a well-informed gentleman) that the average peach crop of the state of Michigan, this year, had not paid a great deal more than other common farm crops, have paid. It surely is a better business than that if rightly handled.

Now, I hardly think that I can ramble around on this general subject without, perhaps, being a little too personal, which I would rather not be. The first thing, it seems to me, to be considered by a successful fruitgrower of the present or the future, is the man or woman, because it is a business in which a woman can well engage if she has the capacity and the love of it; the first thing to be considered is not soil nor climate nor markets, nor anything but men—men who have this love of choice fruits in their hearts, and an appreciation of what the public wants, the nerve and the courage to stay by the trees and the markets year in and year out, regardless of results, simply keeping everlastingly at it, according to the best lines—bright and thorough as they may be, and ever ready to learn from another, whether he be bright or stupid, because (remember this) we are always learning, and there is just as much opportunity to learn from our neighbor who makes a failure as there is from the other fellow who makes a success. It pays to keep our eyes open, to observe all we can, and at the same time be willing to give information to others. He must not be a selfish man, he must not be a narrow man, he must be a man who is perfectly willing to give out all he has. There are no good secrets in good, honest, lovable horticulture. Be free! If you have any good ideas in production, in marketing, give them out. The old saying was, which I didn't quite believe, that it was better to give than to receive, but as I grow older I find that it means a great deal, and the more we can give out, of good thoughts and good work and good ideas, in this horticultural line, the more will come unto

us. A man will grow rich in giving. So, I say, the first essential thing is the man. The man must be right first, before he can make a success, or a very great success, of fruit-growing in the future.

Then, of course, the next thing is the location. There are a great many more acres of suitable peach land in America than you and I ever dreamed of. Do not get the idea that the area that is susceptible to proper peach development is rare. There are thousands and thousands of acres that a few years ago we never thought of being suitable for peach growing. Ordinarily there is no necessity of going into this question of the soil and location for peaches; but for the best development of a great variety, a good, sandy, loamy soil is best. As I said yesterday, there are a few varieties of the Crawford type that a dry loam or a stiff clay suit better. Elevated lands, lands where there is good drainage, are essential, but it is not necessary to have a very great elevation; but if there is an abrupt elevation, where the frost may run off, as well as water, it is desirable. When you are looking for a good peach orchard, look for a place where the water and frost can run off—open drainage for the frost, if possible, but it is not absolutely essential, because frost is freaky.

As Brother Craig has gone, perhaps I can criticise the figures he gave us as to the hardiness of the fruit buds. There is no reliability to be placed upon a single year's test of that.

As to varieties of land, I remember a little case in one of my own orchards a few years ago. Our Connecticut farms are rolling lands, and we have to pick out five, ten, or twenty acres where we can get them, and put them into peach trees. Now, before this time I believed that elevated lands and northern slopes were best, but there came howling northwest weather, twenty degrees below zero, for two days, the wind blowing strong; and at that time, blowing as it did from the northwest so strongly, it seemed to me that the live buds would not be found there, that the north side would be the one to suffer. That was the proper condition, according to theory. As a matter of fact, one orchard on a level plain that had the sweep of that northwest wind, had a good crop of fruit on the outside rows on the north side, and it kept growing less until we got to the south end of the rows, where there was not any fruit at all. Now, that proved one thing. If I had had only that orchard, I would have believed it; but I came back up home, three miles distant, but with the same open sweep and the same valley, and the north side did not bear, and away down under the hill, where it was protected from the wind, we had a full crop. If I had had but one orchard I would have known a heap about how the frost treated that; but as I had two of them working in a directly opposite way, I did not know anything more about it than you do now. So there are local conditions that will creep in all the time, and we can not lay down any rule as to the absolute hardiness of varieties, one compared with the other.

Professor Craig had in his list that he gave you today, the last I think it was, Alexander, Hale's Early, and one or two of those peaches that are in most sections of the country among our most hardy kinds; but in his first list he had Oldmixon and some others which are somewhat more tender the country over. So we can not lay down any rule as to just the soil in which to plant and just what the location shall be; but, generally

speaking, good loamy soil and an elevated one, with good water and frost drainage, is best.

As to preparation of the soil, the peach wants just as good soil preparation as any other crop. The success of any business in soil culture depends largely upon the thoroughness of the preparation of the soil. Too many of us, in the hurry to get in our trees or plants, think that shallow or careless plowing, or even the planting of some grain crop, will answer. It will answer, but it is not best. If the ground is ever to be thoroughly plowed and thoroughly prepared, that time is just before the tree goes in. If there is the least bit of shade of hardness in the sub-soil, it will pay to subsoil the land, and it pays at least to plow it deeply and well.

As to how to plant the trees, how far apart, that is a local question largely. How much land do you own? What is your ambition? Is your ambition to get the most beautiful fruit, the most perfect specimens of peaches, regardless of quantity; or is it to get the greatest quantity you can from a given area? How are you going to prune, and how are you going to do a great many other things? And, as I said, what is your acreage, large or small? As to how you shall plant, some will say 15 feet apart, some will say 18, some 20, some 25, some 30, and I know a "crank" by the name of Hale who says 13. That depends upon conditions. In my orchard in Georgia, of 100,000 trees and 50,000 more going in this winter, the trees are all 13 feet apart. My Connecticut orchards, some of them, are 12, some in the original planting were 16 to 18, but they vary. It depends upon the man, and it depends upon the acreage that you have. Just how we get at that will come in the question of pruning and other questions.

Then the question of marketing, it seems to me, ought to be considered before you plant; and yet, with the railway lines and the ease of shipment to distant points, if you are on a line of railway, it does not matter what your market may be, except if you are going to supply the local market and nearly all your fruit is going into one near-by market, where you can stay and make a name and reputation, and get close to the consumer, then a greater variety, beginning with the early and extending through to the very latest varieties has to be planted. If, on the other hand, you are a double-headed monster and trying to do general farming and two or three other kinds of business as well, you would better concentrate your fruit on one or two varieties that you can gather all in two or three weeks and ship it off in carload lots to distant points. All those things have to be worked out by the man, and the markets must also be worked up by the man.

You have great fame down here in Kalamazoo—a great celery town, known the world over. I have traveled through there on the line of the road, perhaps as often as some of you who live a hundred miles away. I have tried to hammer into those boys who sell at the trains a great bunch of celery, 16 or 18 heads in it, for five cents, that it is all nonsense. If they would put a quarter of a cent's worth of salt with it they could get ten cents and make a hundred per cent. profit over what they do now. They flood the trains every day, all through the fall, with superb celery, and an abundance of it, at a nickel per bunch, and they could sell more of it at a time if they put a quarter of a cent's worth of salt and brains

with it; and that applies to selling peaches. Production is one thing, selling what the people want and in the way they want it is another, and you need to study methods. I have said (I don't know as I ever have in the state of Michigan, but I told it in the state of Wisconsin a few years ago—it is on the line of marketing and knowing what the people want and how they want it) that I was in Chicago and in going down to South Water-st. I saw the boats had come in from Michigan ports with produce. It was early in the season, and asparagus was on the market at that time. It was coming in those shabby boxes which you people use at South Haven and Benton Harbor, in those old boxes that have been up and down the line, real "old subscribers," lain in the gutter until they were covered over, and had been back here and served as chicken coops, and been scraped off and new lids put in and then shipped back to the market. Of course it was not any member of this society, but the other fellow, your neighbor, that was sending them there. I found the price was six cents that day. I pulled some out of the box, it was nice, fresh green asparagus, tied with a piece of bark such as nurserymen use to tie in their buds. In front of another store was a box, a little smaller, a neat, new box, fresh as a daisy, three-quarter-inch stuff on the ends and veneer sides and bottoms, stenciled on the end with the name of the grower and the name of his farm and a little advertisement of his specialties. I pulled out the asparagus. It was just as clean and fresh as the other, but it was neatly tied with little pink cotton tape that does not cost five cents per mile. Somebody that appreciated doing good things was back of it. It was neatly put up. I said, "Let me take a bunch of that." The dealer said, "What for?" I said, "I want to take it up next to the 'old subscriber' brand and see how it looks beside that"; and I took it up there and laid it on the table and pulled the two bunches open; and presto! you could not tell the difference. It was grown under the same sun, in the same soil, and the same rains had fallen on it; but the package which was tastefully and nicely put up sold at ten cents and the other sold at six—40 per cent. advance, or more than that. Do you suppose that man wants the government to take care of him?

Now, you can say to me, "those Chicago people are not such big fools as Mr. Hale thinks; they won't eat pink tape." But the grocers jumped at it. They knew that away back somewhere in the city there were customers who appreciated a nice-looking package, who would stop and buy at their stores more readily if it was so, if it was tastefully put up, and therefore they paid forty per cent. more for it; they knew there was somebody back there who would pay for it. They were studying the market—cold, hard-hearted grocerymen who were in the business from the standpoint of making dollars and cents—and they had learned that the public would pay for something tastefully put up, and they were paying for it; and many of you have seen that same thing all along. Yet the trouble is, we think that we have done our duty when we have stuck the trees in the ground and cultivated a little and got the fruit, whatever comes, and then say, "We have been unfortunate this year; the crop is poor, it is a little off-color, and it is not quite what it ought to be, but it is the best I could do." We do not exert ourselves enough.

In starting a young orchard, there is a difference of opinion as to large trees or small trees, as to the condition of the roots, etc. In my opinion

there is a good deal of humbug about all these fine roots on peach trees. Some people say, "Give me a nice lot of fine roots; I want trees that have a great mass of fine roots." That is all right. Well, now, bless your heart, it is hardly possible to take a tree from the soil and handle it with the greatest care on your own grounds, and preserve the vitality of those fine roots, much less in handling it over any distance, as we ordinarily do; so that my belief and my experience are that if you get a medium-size tree with two or three large roots on it, you have all you need; and if you have a good sharp knife and will cut the most of those off, and also the top, you are better off still in starting the orchard. My Georgia orchard was started by taking small trees, fifteen or eighteen inches in height only, cutting them down to twelve inches, and then cutting the roots almost entirely off, to less than an inch of root, and cutting in such a way that what were left were in fan shape. If the roots ran in three or four directions, the two outside were cut off, and then those roots were planted by putting a spade down into the ground and pressing it forward and putting that stub in there. Less than one half of one per cent. failed to grow.

You want a thoroughly prepared soil in which to plant your peach trees. My own opinion is that a medium-size tree, neither a very large nor a very small one, is best; that the roots want pretty close pruning, and they want good, clean-cut pruning, not such as the nurserymen give them with their machines, but a careful cutting; and if you cut very closely you will get far more rapid and sure growth. But some will differ with me.

Mr. Garfield: Would you treat trees the same way in Georgia and Connecticut, in planting out?

Mr. Hale: What I am talking of now is methods of planting for Connecticut and not Georgia, although all my trees planted in Connecticut for the last five years have been closely root-pruned.

Mr. Lyon: Do you think that that process will do as well at the north as at the south?

Mr. Hale: I am practicing it in Connecticut, sir, and would in Michigan were I here, and yet I may be mistaken, I say after a few years; but your climatic conditions in Michigan are more favorable than ours in Connecticut, by considerable.

As to the cutting back at the top, the general practice and recommendation has been to cut down to a single stub and allow a few to grow near the top. The objection to that is, we often form crotches in our trees that split down in later life. Some successful growers have followed that by another cutting back, leaving six or eight inches on perhaps three side branches, and then perhaps two or three more at the top, leaving them four inches in length, and so starting the new growth from side branches already established, and there is not much question but what it leaves a more permanent head and less liability to splitting down than where we whittle down to a single cane and start entirely new side shoots.

Early spring, of course, is the only time to plant peach orchards for best success. You may do it in the fall, in certain localities, if you can get thoroughly ripened trees; but you can not, of course, with northern-grown trees. I believe, while it is easier in gathering fruit to have

varieties all by themselves in solid blocks, yet by a mixture of varieties, or a closer intermingling, you can have better results, and yet many of us dislike to practice that because it is difficult; we would rather have one clean block of one variety, and gather the fruit, than to have different kinds all through the orchard, a mixture. I have had the finest fruit and the best pollination and the best development of fruit and the surest crop, where I have had different varieties intermingled.

As to the production of other crops in the orchard, the past policy has been to grow other crops in the orchard. The peach-grower of the future, I think, will learn better than that—one thing at a time, and that well done. In planting your peach orchard, do not get the impression that you can run two crops on that soil at the same time. The successful peach-grower of the future will never do it, and very few of the most successful peach-growers of today are doing it as much as they used to. It can not be done, year in and year out. Some of you may jump up and say that in the early days you got all the growth you wanted, and more too. Perhaps you did. But, one year with another, the man who puts out his peaches and believes in peaches and works for peaches, and stays with them, will get peaches that bring him his final reward, and he will get it on this earth, too—he does not have to wait to go over “the river.”

Peach-growing of the present, peach-growing of the future, soil production, production of flowers and plants of any kind, is really a manufacturing process, brothers. We are manufacturers, and the results of our product depend very largely upon the improved machinery, the methods of handling our factory, the labor we put upon it, and the raw material we furnish. Now, I noticed by the discussion this morning as to the plowing under of oats, that you have many acres in Michigan that evidently have an abundance of plant food, at least of certain kinds; but in the future some of that food is going to be used up, and some of that raw material will be gone, and we must study the feeding of the trees for the best results; and, as has been said here by your worthy president, potash is the main reliance of the peach-grower who is on sandy soil, but he must have a reasonable amount of phosphoric acid and a certain amount of nitrogen. Just at present he will get his phosphoric acid, probably, by using raw ground bone. Whether he will do so in the future or not, I do not know. He gets potash in hardwood ashes, those who can, and those who can not have to take the potash of the German mines. You must have phosphoric acid, you must have nitrogen to a certain degree; your nitrogen you can not trap entirely from the atmosphere. That matter was pretty thoroughly gone over by Professor Craig, this morning, and it will pay to crowd the growth of trees thoroughly and well from the start.

Now, there comes a question of ceasing cultivation in midsummer, stopping early, that the trees may ripen. I do not know but I am treading on dangerous ground, now, but observations within the last few years are convincing me that the hardiest of our plants, our outdoor plants, are those that can be kept growing longest. I used to think of my peach trees, that if I ceased cultivation pretty early, and they ripened up and were thoroughly well matured early in the season, and dropped their foliage some time in November, that I had the best results. That is one of the things that I do not believe now. Keep your trees growing pretty

well into the fall. Do not let them ripen so early that the fruit buds will be thoroughly developed, and thoroughly ripened, well matured, perfectly so, early in October, for then, perhaps, if we have some warm weather early in October or early in November, they swell and think it is spring. I think the later you can keep your trees growing, within reason (I don't mean trees that are kept growing late in the fall because they have gotten a liberal taste of nitrogen), the better will they carry not only their wood but their fruit buds, under most conditions; and that is true of your raspberries and your blackberries. To my mind that is one of the most important ideas in culture that I have developed in my business within the last four or five years. Feed for vigor and hardiness of tree first, and that comes largely with heavy tastes of phosphoric acid and potash; and when it comes up to the fruiting time you can hardly give too much potash, because, as President Morrill says, what the tree and fruit do not take up is there for future use. In talking about the color of Elberta, some one said, "Give it potash enough and you can color it." You certainly can paint the peach red, with potash, and the more the merrier, up to the limit of your bank credit.

In the matter of feeding, of course, local conditions must be considered—soil and everything of that kind; you must judge for yourself. Our friend Riehl tells us it is not necessary, or does not pay, to supply potash at all on his soil. I am not talking to him, then, about potash. Everything that is said in relation to the management of your orchard or your trees or your business, of course does not have general application and must be modified to suit each locality.

After the orchard is planted, its early cultivation may be carried on in any way that suits you best. Anything that will stir the soil deeply the first two or three years, so as to get the roots down well, and after that not so deep stirring; and what you can use most economically are gang-plows, spading harrows, cut-away harrows, smoothing harrows, or disc harrows—they are all good, each one has its place under your soil or your particular conditions; but something that will keep the soil stirred, and from the time it is planted until it is time to sow in the fall or mid-summer, to sow in the crop which you wish to put in. My practice is to sow between the rows either cow peas or soja beans, then keep the cultivator going between the rows until late in August, when their tremendous growth drives us out of the field and they take possession.

I was sorry that the subject of pruning was taken up this morning and I was obliged to be absent. I would like to have heard what President Morrill said on the subject, and what others had to say about it. In its early days, after a tree has been planted according to methods that you or I may adopt, either by the single system or leaving one or two side branches, of course we get the first year a tremendous growth—two or three or four or five or six feet, according to the soil we plant on and the conditions under which we plant. It has been an old recommendation to shorten in one half or two thirds, shorten in down to a foot or sixteen or eighteen inches on the stem the first growing year. I think that is a mistake. If we shorten in as closely as that the first year, we get a solid, compact head. Each shoot we cut off this spring, in the summer will show two or three heads, and we get a too thick and compact head near the ground; so that my idea is that the first year's pruning,

that is, at the end of the first year's growth, should be done with great caution not to shorten in too much. Shorten in well, cut out all the crowding-in branches, but I would leave two and one half or three feet of each leading stem that I proposed to have there for the tree, the first year, so as to get up and out of it without too compact a center. Until the tree came into bearing I should prune for form closely, cutting in every year and building the shape of tree which I wanted, which would be a broad, open one with not too much of a high, central top, but a flat-topped tree. That is the method to be carried on until you have built up your tree to the bearing age; and all of that pruning, I may say, may be done any time in the winter after the hardest frost is over, but never in the fall. Fall pruning of the peach is a delusion and a snare, and while you may do it successfully many times, it is dangerous. The pruning of a tree is a weakening process, and to weaken a tree just going into winter quarters, or as it has got in there, is a bad process. I am speaking now of northern climates. We are talking of Michigan and Connecticut. We will not prune until the cold weather of winter is over. When you come to the bearing age, you have another condition. You have been growing this orchard for peaches, not for fun, yet you have been growing it for fun and peaches—I mean the fun of seeing it grow. But eventually you want peaches there, and you have the conditions of winter and killing of the buds many times to contend with. If you go in in February or March, when a suitable time has come for pruning, if you are pruning for form, possibly 50, 75, 80, 90, or 99 per cent. of your buds may be dead; and if you go on pruning your tree for form you may sacrifice fifty per cent. of all the buds there are alive, but it does not matter if you sacrifice fifty per cent., if you have fifty per cent. alive, or if you have but twenty-five per cent. alive, you can still afford to sacrifice half of that and have a full crop. If there is only one or two per cent. of live buds, and that is a condition you will have to contend with occasionally, my practice is, and I believe that of the successful men of the future will be, to prune after the buds have begun to swell in the spring. My practice is that in years when there is no uncertainty about the buds being alive, if they are all alive up to the first of March, we go in and trim the whole orchard and trim according to form; and if they are largely killed; as they will be many winters, then we go in and trim for fruit entirely, regardless of form. I have practiced that method of pruning a number of years, a good many in Connecticut, and it has resulted more than satisfactorily. Probably it would be boasting, or seem like it, to say so, but I presume I have had the worst-looking peach orchard at times of any man in America, but I rather think I have made more money out of it, and I know I have had more fun. Yellows and borers are not going to trouble the successful fruitgrower very much. All these things are blessing, all the troubles we have are blessings to us.

Mr. Morrill: You must be very careful. I was asked one time, up in Oceana county, what I thought of yellows, and I said I thought it was a blessing, and it was hard for me to stay there the rest of the evening.

Mr. Hale: Yellows, I presume, like the poor, will always be with us, and needs be taken care of; but there is such a thing as starting right—starting with healthy trees. We have not yet found what yellows is,

nor where it comes from, nor where it is going, but there is such a thing as starting with healthy trees and there is such a thing as starting with diseased trees; and whether you start with healthy or diseased ones, yellows is pretty likely to break out sooner or later, only it will be later when you start right. You must first study yellows to know what yellows is. Three quarters of the peach-growers in the country know yellows in its advanced stages, about three years along, or four years, but not before. We should learn what yellows is, when it first shows itself, when the first sign of it is on your most thrifty and most lusty and green trees in the whole orchard—that some one shoot, perhaps in the center of the tree, usually the central top, is growing a little stronger than the rest, setting its leaves a little more thickly than the rest, and if you get it just in the right light you will see a little wavy, crinkly leaf and a little shade of yellow running through where it should be green. Yellows may be in the young tree, and be there long before it shows anywhere else, and then is the time to take that tree by the nape of the neck and pull it out of the ground and burn it; and no matter if yellows goes right through the best part of your best orchard—never hesitate, never stop a minute. If you do not discover it until the trees have been bearing, and they are loaded full of large, fine peaches, and there is but one peach on the entire tree that shows a trace of the disease, do not wait to market those peaches and get two or three dollars, but pull the tree right out before you go to Sunday-school, if you find it Sunday morning; or if you have to stay home from church to do it, you are doing God's good work. Get it out and burn it as soon as it appears. A man who will not do that will not take front rank in peach-growing in the future. The man who will, and follows it up and keeps everlastingly at it, need not worry very much about yellows. You must be happy and contented to see trees go, because you know that the others that are left will be enough better.

Borers must be treated in much the same way; that is, they should have close attention, and proper washing of the trees each spring must be done as soon as the mother-moth begins to fly that deposits the egg on the best of the trees. A wash of carbolic acid and lime, or any other adhesive substance that will hold it to the tree, will keep off the moth. I have used crude carbolic acid and some potash, because potash helps to smooth it for the next year. If perchance a few borers get in, they should be dug out once or twice per year, and it is not any great trick to run over your orchard in the fall of the year, and dig where there is any trace of a borer. In our Georgia orchards, where they have no seasons and breed quite freely, we find it to advantage to go over the whole hundred thousand trees twice each year, and where the trees are thoroughly and well washed less than five per cent. will ever receive a borer.

Peach rot, which is another one of the blessings that come to us, is held in check by spraying with Bordeaux mixture, and the best time to spray is in the spring before the foliage is on, because peach foliage is pretty tender and it is risky to spray—not, of course, so much with Bordeaux as it is with arsenical sprays. One spraying in the spring, just before the buds swell on the tree, of Bordeaux mixture, and then with a weaker solution two or three times during the growing season, up to the time the peaches are one third grown, will prevent practically all of

the rot, even in the most unfavorable seasons; but occasionally rot does spread in the orchards. Keep your men there to look after the orchards, and at the first sign of a single rotting specimen, start them picking all over the orchard, dropping the diseased fruits into a bag, not on the ground, and carrying them off and burning them, bag and all.

Curculio has not troubled us very much here at the north, but it is going to; it is coming, sure, and we will have to contend with it. That is another one of the blessings. It is going to thin out the fellow who has not faith enough in himself and his peach trees to attend to them, and then you will have a better market and that is what you are after. While the curculio is not very prevalent in northern peach orchards, it is in some sections. In our Georgia orchard last year there was a considerable amount of curculio, considerable stung fruit. We did nothing to fight it, because we did not discover it until it was well along in the season and it was practically too late. I resolved this year, and planned a campaign to fight the curculio. So, early in the season, when the fruit was as well set and as large as hazelnuts, we made some experimental jarrings and found the creature was there. We then made some trays, taking thin lath material about fourteen feet long, bending it to a half circle and then putting a thin piece of lath across the side and covering it with heavy cotton sheeting. We had a large tray, a half-moon tray, fastening a cord at each lower end and up toward the center and to one central cord, so that you could grasp it in your hand and carry the tray out and put it under the tree, and all this brought together under the tree gave us an inverted umbrella-like affair. Then we took clubs an inch in diameter, of oak, and padded the ends with rubber, and then got out fifty people and put them on twenty-five rows of trees. Our orchard is set in blocks a thousand feet long and five hundred wide, seventeen miles of trees in the orchard; and instead of lengthwise of the row we went crosswise. We had fifty people with each one of these outfits, and they got under twenty-five rows of trees, and at a word of command from the foreman, bang! (or two bangs) went on each side of the tree, and quickly to the next tree and under it, and bang! again, and so on across the field, across the plot of 500 feet; and by keeping constantly moving the curculio that dropped on the sheet would not stir nor try to get off, as they would if you gave them a moment's rest; and when we got across to the other side there were little darkey boys with kerosene buckets, and there the curculios were dumped into the kerosene and put into the barrels that were waiting. The men were given a rest, and then across the field again, took a little rest, and then hurriedly back and forth; and we "banged" those trees seven long weeks, fifty people at it every day. Those southern people said, "Those Yankees are a curious lot; Hale is knocking off his green peaches"; and we did, because that jar would take off certain peaches, but we kept at it seven weeks, and the adjoining orchard, which had a better show of fruit in April than we had, marketed eighteen carloads of second-class fruit, all more or less curculio-stung, bringing a net profit of a little less than \$300 per car. We marketed sixty cars of fruit, and over fifty of it were of absolutely sound fruit, and the net profit on each car was a little over \$500, or about \$30,000 for the orchard, net, and I am satisfied that that fight of seven

weeks paid a net profit of more than \$20,000. It cost more than \$1,000 to do it.

Mr. Moseley: How large are those trees?

Mr. Hale: They are four-year-old trees, very well developed. It looks like a big jar. In talking of a plum tree being jarred for curculio, I said, "Good gracious, shake that tree a week and it will cost more than the thing comes to"; and when I talked to my horticultural friends about jarring for curculio on a hundred thousand trees, they simply said the thing could not be done; but we went at it, and so thoroughly systematized it that we went over 50,000 trees per day, over the entire orchard every two days, and kept it up seven weeks, and the result was that we had a crop of sound fruit and our neighbors did not. Now, that of course was a good thing for me. It was a good thing for the people in the markets who want nice fruit, and seeing it was going to be such an everlasting good thing for them, they paid for the banging, I didn't; and it is the same way with you—they will pay for it, and the time will come when you will have to do it, and it will probably be a blessing rather than a curse.

This building up of the orchard, this feeding it, this cultivating it, this pruning it, this caring for it at all times, is the one thing that is going to bring success. You know the Good Book tells you that you know not at what hour the Master cometh. That means not only one master, but all the others. The master crop may come at any time; you know not when it is coming, you must be ready for it, you must always be ready, and the only way to be ready is to build right up all the way through and expect you are going to get a crop; if it fails on account of adverse conditions, that is not your fault.

When you have a crop of peaches on your trees, then comes the next thing, the condition of the fruit. You can not grow peaches successfully if you have not the moral courage to thin the fruit. A peach should never be within six inches of any other peach on the tree, if you want good peaches, and thinning may be done in years of great abundance largely by pruning. I suppose that is the way Brother Morrill does. In years when the trees set full of fruit you can do much of that thinning by pruning, and cut off quantities of it; but later it must be done by hand, and later you must go over those trees and pick off all the inferior-looking specimens first, and then thin down so that they are not within six inches of each other, and I think the fellow who talks to you twenty-five years from now will say they should not be within a foot of each other, if you want peaches for the market, though I think today six inches will do. I talked four inches a year ago, and I have got up to eight, so that I believe in eight really, but I think the time will come when we will say a foot, and then you will have peaches that you can talk about being, not so many "inches" around, but so many "feet" around!

There should be in every orchard or every neighborhood a large central packing-shed. Now, the man with a small acreage can not do all the things that the man with the great acreage can, but he can get together with a lot of his neighbors who have small acreages; there should be a central packing-house to which the fruit should go. In every large orchard you will have your own sheds—perhaps in every orchard that exceeds twenty acres in extent, or perhaps over fifteen, but there should

be a central packing-house somewhere to which all the fruit is collected for packing. I went down into western Maryland this fall and studied their fruit methods there. I found them packing peaches right in the field, down on their hands and knees, packing them in boxes and crates, packing them wherever it was convenient. The bottoms of the packages were dusty and dirty when they went into the car, and they were soiled generally. There should be a central packing-house.

Then comes the question of picking the fruit to get it there. The question of how to judge fruit when it is ripe is an important one. No hand should be laid upon a peach until it is ready to come off the tree. Take hold of the limb and look at the under side of the peaches and learn by the shade of color on the under side whether they have come to full maturity. If they have, then with a very careful, gentle hand, take them off, not pressing upon them in any way.

The question of how near maturity you wish your peaches to reach before you pick them, will depend upon the market. If you are just outside of Grand Rapids, and are going to deliver the fruit early in the morning, you can let it go to full growth and full mellowness on the tree, pick it in the afternoon and get it into town in the morning, and the people will have an almost perfect peach. If you are going to ship it further away, you will pick it when it is full grown but not so mellow. If a peach is fully grown, thoroughly well grown, the under side, if it is a white peach, will take on a pink color instead of green, and if it is a yellow peach there will be pale lemon instead of green. We take a class of men or pickers and go out with them for two or three hours three or four days in advance of the picking, and we study the question of ripe peaches. We keep them observing two or three days until they know what the color is that means a fully-matured peach, and it is important to know that.

The peaches, when ready for picking, should be placed in a low, open basket that is padded in some way. Just how it shall be padded is another local question, but a padded basket of some kind, that will not hold too much fruit (twelve quarts is plenty—some say as high as half a bushel, but there should be a smaller quantity, so that there shall be no bruising in picking). There should be careful picking, more careful than you would be with eggs in putting them into a basket, hauling them to the packing-shed in some low, easy spring-wagon, so there shall be no jarring. There you need nicely arranged tables and everything that is convenient and easy for ladies' work. I wish ladies could pick peaches, but it is rather rough work, tramping over the orchard, for girls, although some of them do it. You should have in your packing-shed ladies of culture and taste. You do not want any "mutton-heads" there—of course there are not many mutton-headed women, but there are lots of such men. But you need women who have education and refinement and taste to sort and pack good peaches. No one else can do it and do it well. When I first began trying to pack fancy peaches for a fancy market, I got young men, well brought up, of Christian parentage, good Sunday-school boys, good as boys will average in Connecticut, and I showed them how I wanted them to handle those peaches and how I wanted them to pack them; and, bless their sneaking hearts! they would not do it right, and would get big peaches on top. I told them I did not

want them to, but they would do it. Then I got a lot of girls, and said to them, "I want to pay you so much per day for your work, and then I want to pay you just so much for your 'know-how' and for your soul and heart and taste." I wanted the best part of her in that packing-shed, and I wanted her to put it right into those packages, and I would pay her for it; and so I got girls of that stamp, and the man who is going to grow fruit and put it on the market must get that class of girls. Women are conscientious and honest, they will do just what you tell them, if you treat them right, and that is the only way to handle women—I will tell you that! Decide upon the grade of fruit you are going to have and how you are going to have it graded. Then let these ladies carefully, by hand, take from the picking-basket the extra size, whatever size you decide shall be extra, but perfect in every way, and put into one package; let the next lady grade whatever you have decided upon as the next grade, and put into another package, and a still lower grade into a third package; anything that is irregular or off color, no matter how large it may be, put it into a large cull package, and if it is a little irregular and smaller, put it into a small cull package. Then you will have five grades of peaches, and if there is anything over-ripe or decayed, it should go into the refuse crate. Then pack the three grades of perfect fruit, pack them solidly, full from top to bottom, have them absolutely the same all the way up, never any topping-out, just the same in the middle as in the bottom, just the same on top as in the middle, and the same all the way through—everything perfect specimens, the basket or box, or whatever it may be, filled as full as you can crowd it. If it holds sixteen quarts, get in eighteen if you can; if it holds ten quarts, squeeze in eleven or twelve if they can be got in there; but get it full and solidly packed all the way through. Let the package be—but the question of packages would take up the whole evening.

Study your markets, and what the markets want and for what they will pay the most. You will find this: That people pay most for the most tasteful package, the one that is neatest, and the size of the package should be just as large as you can crowd into the family home. Now, a family of five or six boys, with good digestion, will consume a half bushel of peaches, if they are there; but if you only slip into that family a six-quart package, they will eat but six quarts; if you get into the house with half a bushel, so much the better. Use just as large a package as you can. Do not try to see how small a one you can get, so that the people can pick it up and carry it here and there, but make just as large a package as will carry the fruit well and get it into the home—then you have increased consumption. But the question of packages is a local one. Whatever the size, whatever the shape, whatever it may be, let it be of the neatest and whitest wood that you can get, regardless of cost. Do not ask your basket-maker how much he is going to charge you for the packages, but how good he can make them and how attractive, and then get them.

After you have packed those baskets full, and perfectly all the way through, you certainly can not afford to let the fruit go to market without "tooting your own horn." Fruitgrowers do not brag enough about their business, and I suppose the reason is that they have not anything to brag about. But if you have something to talk about, advertise it. You find

that people advertise from one end to the other of the earth, if they have a good thing.

Now, I told you perhaps I could not talk without being a little bit personal. We are American citizens, down east. We believe in the national colors; I believe in the flag; I believe every home should have a flag-staff somewhere, and on every national holiday and every birthday in the family, and every other family anniversary (every time pa comes home sober, or anything like that) hang out the American flag. I believe in America, I believe in every farm having a flag. I go around your great city here and find your successful manufacturers of furniture—I do not find them down the side streets, with nothing outside on the buildings. They have paid money to have great advertisements put on the outside of the buildings, to tell who they are and what they are doing there. I believe every farm should have a name, some little, local, poetic affair that connects the family and the home or the surroundings, whatever it may be; but have your farm named, have a little sign out in front with the name of the farm on it. Do not be ashamed to own up who lives there, and have a little advertisement of the specialties of your farm production; and then you should have it tasteful enough in its surroundings not to be ashamed of it.

Now, believing in the American flag, I selected for our colors, red, white and blue. [Mr. Hale here exhibited to the members some labels.] These labels cost us sixty cents per thousand. We sell them for \$500 per thousand, \$499.40 profit. That is, of course, a Yankee trick, but we do it. How do we do it? By following the methods I have been talking about until we get into the market; and then, when we have the peaches there and have the labels on them, we get about fifty cents more with that red label on than the other fellow does who does not believe in this label and our other methods. All the extra-size fruit, if it is perfect in every way, gets this label, which is a little advertisement of the fruit and a guarantee of it. The leading thing in it is "Hale's Peaches." If they are poor, he will bring them back; if they are good he will come again. I make him pay for them—it is my business to see that they are good. We guarantee that that basket is perfect from top to bottom, that there is not an inferior peach in it.

On the next grade we put the white label, a lower grade but a perfect peach in every way, but they are graded according to size, and are perfect specimens, the only difference being in size. By growing the best we know how, in best seasons, we get more than fifty per cent. of the extras, and perhaps thirty per cent. of the No. 1's. Now, those large peaches, if they are away off color, or are a little out of shape, go in as large culls, and we sell them without any label at all. We do not care to have it known whose they were or where they came from. If asked, we would guarantee there was not a perfect peach in the basket, and yet we get almost as much for them as though we had mixed the good and bad together. In our southern orchard we use one label, the red, entirely. We ship from the south only the very choicest fruit.

I am making this personal, so that you can see what I am doing myself and what I believe others will come to. We go to certain markets which we reach in Connecticut, and instead of shipping to Boston or New York to some commission man and letting him sell it at the first place he can,

I went to these markets and hunted out retail dealers in fancy fruit and tried to show them what I was doing in the way of growing fruit, and how good it was; and in the small towns I said to them, "I want some one man to be my agent here; I will advertise the fruit, I will put it up well, and if you will handle it, why, I can make some money for both of us." We got up little circulars which advertised the peaches, and if the dealer gives us the names of his best customers we mail them direct, showing that the dealer is going to be headquarters for our fruit. If it is a larger town, and we put the business in the hands of a jobber, we ask him to give us the names of the fancy grocers and of the people he deals with. Now, just before the opening of the peach season last year, we mailed these circulars to every retail dealer in fancy fruits, etc., in the city of New York and in the New England states, and in the distributing territory of Philadelphia and Newark. We mailed them to the stewards of every hotel and every club house and all those that were likely to buy good fruit, three or four weeks before the season opened; and just as the season opened we mailed them again to all those people, with another announcement that the peaches were now on the way to market and could be found in the hands of our agents. Then we have one man, an agent, at each center, and we tell him that he must come to the orchard and see how the thing is done. You know you can not do business without understanding one another. This idea that the commission man or the dealer is, somehow or other, trying to get the best of you, that there is a separate interest between you and him, is all wrong. You are all partners and all working together, for you must get right in sympathy with the dealer, with the jobber, or you would better get out of the business altogether. I brought them up to the orchard, and I said, "Gentlemen, come to the orchard and see what we have and see how we do it." I have taken them around among the trees and explained the method of culture, the method of handling, and how we judge when they are ripe; have taken them to the packing-sheds and shown them how the work is done there, and taken them on the cars, and all the way through, and when the peaches get into the market, and the dealer comes up to them to buy, the agents know what they are talking about; they have faith in the fruit and the buyers must have faith—and then make them pay for it, and they are willing to do it. We distributed some 200,000 of these circulars, and here is a fac simile of the label telling them if they found fruit bearing that label they would know it was all right.

This, in a crude way, is something of the methods of handling. You can not afford to spend year in and year out in growing fine fruit and then fail of getting the last ten cents, or twenty-five, or fifty on top, because your consumers do not know what you are doing. They think your fruit is like all the other they have been buying—good on top and inferior on the bottom. You can not afford to have them possessed of that idea.

After doing all these things, you must reach the people in some way and let them know what you have; and do not forget at any time to make them pay for it—the more you make them pay, the better they like it, providing the fruit is good.

The past summer I talked with the railway people, with the presidents of the roads that lead to the south where I go, and I invited them to the

orchard, I took them into the orchard. Now, a man, perhaps, with a small orchard, can not get the president of a railway or steamboat line to go and look over what he is doing, but you can through an association of men all working in the same line. Tell the railway men you want the very best service they can give; that their trains must leave at an hour that will accommodate your business, leave at an hour that will suit the markets, giving prompt and quick delivery, and that you are willing to pay for it because you will get enough more out of your fruit; but do not ask the railways to be everlastinglly lowering their rates—ask them to keep up with their service, and you go on with your quality, and the money you will receive will be enough to compensate you for your labors and the railways for theirs. Work in harmony with the railways and whoever has to handle your fruit; consider him a partner in your business, and make a friend of him; let him understand what you are doing and how you are doing it. Do not ask favors, but simply justice, and you will not have any trouble with the railway men. Railway managers are bright, sharp, shrewd, honest business men, as a whole, and wish to do business man-to-man fashion. I do not own a dollar of railway stock, and never did and never shall; but I have found railway men as good men to do business with as any on earth, if they are met right, but the trouble has been that we fruitgrowers have handled our business wrong-end-first, and then cursed the railway man and the commission man because they did not make it pay. It didn't deserve to pay.

Then, as to the markets to which you ship. Stick to the markets, stick to the same markets; decide what markets to use and then follow them up year after year; make a name and reputation and hold by that market. You can not afford to ship one time here and one time there and one time somewhere else, because somebody else says those markets are good. You will not be known there. Follow up the same markets. I have retailers to whom I could not sell a peach during my first season, but they have had the fruit and they know it is good, and they take it and pay for it day in and day out. We have customers who retail as much as a hundred bushels of fruit per day six days in the week, and in cities not half the size of Grand Rapids. The trouble has been with too many of us, in the past, and some in the present, that we were trying to do a \$10,000 business with a ten-cent head and with a ten-cent management. Now, you must reverse that thing and get a \$10,000 head on the start with a ten-cent business, and work it along up. We should think more and work less. I said yesterday something about judicious laziness. We need a little judicious laziness on the part of the fruitgrower. Not that he must not be alive and alert at all times, but he does not need to work so hard and think so little—he should think more and work less.

We have been talking about peach-growing from its commercial standpoint, but there are thousands and thousands of town and village and country homes in Michigan that have not full fruit supply, and hundreds and thousands of farm home's that lack many of the comforts and luxuries of life that they ought to have, largely because their possessors do not know how to provide them. While we are commercial horticulturists, and are considering our business from its money standpoint, we should not lose sight of the blessings that horticulture may carry into

every home in this land. Let us help carry it there; let us help by our knowledge and by judicious suggestions, and help here and everywhere, do what we can to make rural life a blessing and better than it is, because, for all the money we may get out of the business—we do not wish it to pile it up, we do not wish it that we may say we have grown rich, but we desire it in order to help beautify the rural homes of this country. Every farm home in this land can have around it a picture that money can not buy. Just the doing away with a few old fences, cleaning up the nasty, abominable back yard of the average farm home, and the planting of beautiful flowers and shrubbery and trees and vines, and a little judicious pruning at the right time, and the mowing of the lawn and the planting of flowers—something that does not cost much money and will fill our souls with gladness, something that money can not buy—that, it seems to me, is one of the peculiar works of the horticultural society. Let us do more to beautify and spread happiness in the farm homes of our land. (Applause.)

DISCUSSION.

Mr. Ramsdell: Have you ever used a grader for grading peaches?

Mr. Hale: I have seen such machines used, but I love the peach too well to put it into one of those abominations.

Mr. Cook: In the course of your talk, you spoke of raising one crop at a time. We have in this country, where we are subject to drouths almost every season (we rarely escape a dry spell of from four to six weeks in ordinary seasons), to plant corn or something of that kind for shade in order to protect from the strong sun the young trees. What would you say in regard to the utility of that?

Mr. Hale: What should I say to a man who would set up a thousand pumps in his field and go to pumping water out and running it off somewhere, and thinking he was making money and keeping the ground moist because he had the shade of those pumps? I would say he was woefully stupid.

Mr. Wiley: Have you had any experience with what is known as rosette in the south?

Mr. Hale: Rosette has not been in the section of Georgia where I am; it has been within seventy miles of us, was quite prevalent there four or five years ago, and when it attacked the trees it would kill them in one season. It is a clustering growth on the tips of some of the branches, something like the cluster growth of yellows, only more compact than what we call pennyroyal growth in yellows. It will kill a tree in a year, but they have done little to eradicate the disease, pulling out and burning the trees, but the disease is rapidly dying out. There was very little of it in 1895, and scarcely any in 1896, so far as I know. It seems to be a disease that broke out six or seven years ago and was most prevalent five years ago, but there is very little of it.

Mr. Sherwood: I would like to ask what size package you advocate for your longest shipping?

Mr. Hale: For long shipping the best package that we know of at the present time is what is known as the Georgia fruit package, the six-basket carrier.

Mr. Sherwood: Something like a tomato crate?

Mr. Hale: Something like a tomato crate. It should be made of better material, whiter, but that general package seems to give the best satisfaction in the trade for long shipping.

A Member: How large are your baskets?

Mr. Hale: The baskets hold four quarts when well filled.

Mr. Morrill: About five pounds' weight on the average, do they not?

Mr. Hale: The whole package, as it is usually packed in Georgia, weighs, loaded, thirty-six to thirty-eight pounds. We pack ours so tightly that they weigh about forty-five pounds.

Mr. Morrill: I used the same package the past season, with great satisfaction, on fine fruit.

Mr. Hale: The objection is, it is hard work. It is rather difficult to pack the fruit in, but the girls will learn how to do it all right.

Mr. Lyon: What about mechanical graders?

Mr. Hale: You ought to know better than to ask that question, you dear old soul! (Laughter.)

Mr. Morrill: I am glad Judge Ramsdell asked that question, because so many of our people use graders, and so many of them that I know to be good fruitgrowers (that is, known to have that reputation) have told me repeatedly that they could use them satisfactorily, that there was no injury to the fruit. An agent of the Jones Grader company came along and I told him I could not use it at all; I didn't like it. He insisted upon sending me one on trial. I took it and used it on about five bushels of peaches that were in good shipping condition as we picked them. We took the baskets of peaches as they ran through in the different grades, and examined them, and you could not see that they were injured at all. I set them away until the next day, the time at which they would ordinarily be marketed, and then peeled them, and there were innumerable dark spots under the skin, just ready for decay. If that fruit had been a little riper it would have been in the first stage of decay the next day. Consequently I decided the only way to use a grader was to pick peaches too green to be eaten. I want to speak of a little object lesson that I saw in Chicago last summer—it is only one of a hundred object lessons which may be seen by a man who is watching the other end of the business, as Mr. Hale urges you to do; but this one was so marked that I must call your attention to it. A commission man on South Water street, one morning when I was there, was receiving any quantity and all kinds of peaches, and when I stepped into the store a young man was standing by a pile of peaches in the six-basket Georgia crates, as we call them, the same Mr. Hale uses and the same as have been taken up by some of our best Michigan growers. In that pile of crates was chiefly one variety of peach which was known as Engle, a medium-size, fine peach, in two grades, the name of the owner marked upon them, and there were thirty pounds of fruit, probably, in each. The dealer sat there, simply checking off whatever the buyer wanted of those crates, and there were buyers every minute taking them until they were gone—taking one grade or the other, whichever fitted their business. A load of peaches in baskets of the common fifth size (I do not know that I should name the town, but I will, it was from Fennville—out of the regular Fennville fruit train of mixed lots) was backed up to the curb

while I was standing there, and an Englewood grocer was just taking a dozen of those crates. Now, recollect there were thirty pounds of peaches in each crate. This Englewood grocer took 15 crates, I believe, at \$1.75 for thirty pounds of peaches. He wanted a lot of other stock. This load had 700 baskets on, which were backed up to the curb, and he looked it over and bought it for $7\frac{3}{4}$ cents per basket. Those peaches out on the curb had all probably been through the grader. They looked as though they would stand it. This other lot was picked and handled just exactly as Mr. Hale says, but there were ten pounds of peaches for $7\frac{3}{4}$ cents, of a grade that a good many men grow. Another man, with a better head, was getting \$1.75 for thirty pounds; and you can find just such examples on South Water street any morning if you see fit.

Mr. Hale: I might say in connection with this, that fruit came from Michigan to Hartford, Connecticut, this year in these same abominable bushel baskets, and the dealer could not sell them by the bushel for \$1.25, on account of the four or five grades or sizes that were in the baskets, and on account of the basket. Some man here had the "gall" to say that it was a nice thing in which to ship, for people bought them because they wanted the baskets. If people want baskets they will go to a basket-factory and buy them, and not beat around that way in our orchard. This fruit would not sell at that, and was turned out and sorted and the best of it put in half-bushel Jersey baskets, neat new ones, and a half bushel of the best fruit sold for \$1.50 while the whole of it together would not bring \$1.25. Now, then, the man in Michigan who paid the freight on the bushel—well, he was not a fool, perhaps, because it might have been the president of this society, for all I know. (Laughter.)

The President: Well, it was not.

Mr. Hale: But he didn't know his business as well as he should. He could have saved half on his freight, he could have saved on his baskets, and what he saved on his freight and what he would have saved on his baskets would probably have been eight or ten per cent. profit on the capital he had invested in his peach business. That thing is going on the world over. It is not Michigan alone, it is Georgia, Connecticut, and everywhere else. But let us get over that and above it.

Mr. Tracy: I live in Detroit and I am not very well impressed with some of the facts that I see there. I want to ask Mr. Hale what he would do for that great class of people who live in Detroit and other cities, whose daily wages does not amount to a dollar per day, who have to pay half of that for their rent, and then live in the city? What are we to do with that great mass of clerks who come from the farm, who are working in our stores at Detroit for five or six or seven dollars per week, who must board somewhere? Are we going to shut them out entirely from any fruit? They can not possibly buy fruit of that quality for which we can get \$1.75 per bushel. How are we to supply the great class of the "unwashed," the great class of people in our cities who are not able to buy this first-class fruit?

Mr. Hale: You certainly are not ever going to supply them by sending inferior fruit to the market (green fruit, big fruit, little fruit, and all kinds of fruit together) and letting the better class of people or the moneyed class pick out the little fine fruit there is and pay a big price for it and then turn the ether over to these people and make them pay freight

on the whole of it. You can supply them by growing as fine fruit as you can, perfectly grown, and let them take the second sizes, that are imperfect, and you can sell it to them at a fair price. They will pay you as good a price, and a little better; they are not so poor and so willing to eat pig-feed that they will pay twenty-five cents per bushel for something that has not a peck of good fruit in it, when they can get a bushel of thoroughly good fruit for fifty cents; nor are they going hungry, going without cheap fruit, simply because we adopt better methods or take the highest grade and make people pay for it who are able to; they will have more and better fruit under the advanced methods than they have had under the pig-pen methods of the past.

Professor Tracy: I do not wish to be understood for a moment as objecting to this method, but I wish to bring out here, if possible, from some of these practical men, a way by which the great mass of people in our cities can get good fruit. I know they eat good fruit in smaller sizes, in seconds and thirds, and the time will come when they will buy better fruit, and the money for buying better fruit will come from their tobacco bill and their liquor bill and a good many other bills of a kind that would better not be made; but I wish to bring out here, if I can, some way by which it is practicable to put good fruit, not fancy fruit, upon the market at such prices that the laboring classes, the people who have not large incomes, can buy and use it.

Mr. Hale: In that line, take our home market, where we are marketing the best of our Connecticut fruit. Roughly stated, we get for our extras, which are $2\frac{3}{4}$ inches or more in diameter, \$2 to \$2.50 per half-bushel basket; for the No. 1's, which are $2\frac{1}{2}$ to $2\frac{3}{4}$ inches in diameter, and perfect in every way, we can get from \$1.25 to \$1.50; for the seconds, which are perfect specimens of peach, thoroughly ripened, but below $2\frac{1}{2}$ inches in diameter, sound all the way through, we take half a dollar. You may have a half bushel for fifty cents, or you may have it for \$1.25 or \$1.50, or you may have to pay \$2.50; and by grading it up in that way you bring a higher average to yourselves and bring a lower-price good fruit to the people who can not pay the higher prices. They get more for their money under this method than they did under the old. But, bless you! gentlemen, it is not the millionaire, it is not the man with a big income that buys the most good fruit, by any means; the biggest souls and the broadest spirits are in the great body of the common people and the working classes. They may be a little dirty, they may be a little, as our friend says, unwashed, on the outside, but they are clean within and they appreciate good fruit.

The President: I want to ask Mr. Hale if, under improved methods, the first-class fruit can be grown as cheaply, so that the grower himself can produce it as cheaply, as the poor fruit is produced under ordinary methods? I ask this because so many people believe they can not afford this expense, and I want to ask if it is not grown just as cheaply per bushel, that which is thoroughly first-class, under improved methods, as what we get under the ordinary method.

Mr. Hale: I believe it can be produced cheaper; that the production will be cheaper. It may cost a little more to market it, but the production is cheaper. There is no question but the close, tireless attention to it all the time will produce the fruit at a less cost per bushel. It is

not going to add to the cost per bushel. It may add to your gross expense, but when you measure it by the bushel, I am sure it will not.

The President: And the life of the tree?

Mr. Hale: The tree will live longer.

PRUNING THE PEACH.

BY PRESIDENT MORRILL.

In presenting my practice or system of pruning the peach I do not make the claim that it can not be improved upon or that it is entirely original, but that the plans described and illustrated are the best that I have ever seen put into practice, and I believe are now quite generally followed by the most expert growers in the country. I am fully aware that the plan is indorsed by some growers but for some reason is not put into practice by them; so I will furnish you photographic illustrations from my own orchards, showing exactly how I treat my entire orchard of nearly 100 acres.

In order to fully understand just what treatment is best for any named species of fruit, we must first understand its habits, peculiarities, and requirements, all of which may be varied by local conditions of soil, climate, exposure, etc. These matters each grower must study for himself.

The most prominent peculiarity of the peach is that, under favorable conditions, it makes a much greater growth of top than the root can possibly maintain in full vigor, especially during its first fruiting years; so we practice pruning, with the following objects in view:

1. Symmetry and proper balance between root and top.
2. The preservation of the vigor and fruiting powers of the tree.
3. The proper thinning of the fruit at the best possible time.

I presume it is well to state right here that the plans I am about to present can not be followed by every peach-grower unless the majority of them reform their present method of cultivation and fertilization. I call your attention to this matter because proper pruning, or pruning on these lines, is only of value to the grower who is thorough in all the details of orchard culture.

When peach trees are placed on good soil and given good culture they are probably the most satisfactory growers of any of the tree fruits; but experience has proven that they will invariably establish too many limbs, and in case of the free-bearing varieties will set altogether too many buds --and here is where the skillful grower must step in and use his brains and his shears. If he does not, the trees will attempt to grow, perhaps, ten times as many peaches as the root systems can sustain or mature properly. The result is that you have a very unsatisfactory crop of peaches; the tree is left in an exhausted condition; it can not establish a crop of sound, strong buds for next year's crop, nor can it properly mature all its wood. The next spring you find your tops filled with dead, small limbs, and the trees fail to produce, or perhaps produce a crop of poor,

woolly peaches, devoid of flavor or color, which sell slowly at cheap prices, and this same routine is followed year after year until the grower finds that when he should have an orchard just in its prime he has instead a prematurely aged, broken, and dilapidated one.

All this might be changed for the better, and at nominal expense, if we begin with the setting of the tree to follow well-defined plans laid on proper lines, and follow them thoroughly and on time, year after year, with or without a crop.

In hope of explaining more clearly what I consider proper methods of pruning, I will now show photographs taken in my own orchards, and invite your criticism as we take up each picture; and as Mr. Hale, "the peach king," is with us, I especially invite his comments.

You will notice, as each picture is thrown upon the screen, that somewhere on it is a figure showing the year in which each tree was set, and all the photographs being taken in October, 1896, you can readily figure the age of the tree. Also, in each picture, you will find a man six feet tall, and the step-ladder in use is a six-foot one. From these you can judge the dimensions of trees if I fail to give the same.

Bearing this in mind, permit me to explain photograph No. 1. This tree is one in a block of 5,000 set in the spring of 1896, all third-grade trees, eighteen inches to two feet high, but carefully handled and vitality kept uninjured. You will see that the limbs start about knee-high to a man, and on October 1 the top is as high as his head. You will notice also that the tree as trimmed is only waist-high, with five main limbs saved, which I think is really one too many for ideal shape; but, of course, you all know that it is impossible to make hard and fast rules for work of this character.

We will now move on to photograph No. 2, taken from a one-year tree but bearing its second year's wood. Unfortunately all these trees were trimmed before we got around to take the photographs, so I can only show you the tree after pruning. This tree, you will notice, was started with crotch about eighteen inches high, trimmed and cut back at one year, leaving only three branches, they in turn producing three to four strong limbs, which you see cut back, not quite so harshly as I would have done it myself, but done by my foreman, but on the whole quite a symmetrical tree for a two-year-old. You will observe that it is, after pruning, about nine feet high, and spreads eleven feet. The companion tree in this picture is a four-year Lombard plum which has been treated just the same as the peach. You can see just where it has been cut back each year, and as it stands, is trimmed ready for next crop. This tree, as you can see, is thirteen feet high and spreads fourteen feet. We find that, even under this system of pruning, the plum, except in the case of Burbank, maintains its upright habit; while I think the peach, under this treatment, shows a decided tendency to spread its branches out of proportion to its height.

The third photograph shows a tree of Lewis peach before and after pruning. You will see that before pruning it stood some fourteen feet high, with the current season's growth measuring as much as six feet, and, being a young, vigorous tree, it has many small side-branches. Now, imagine the results of allowing all these small branches to remain, loaded as they are with fruit buds. It would mean that, if the winter is favor-



FIG. 1.—Tree set April, 1896, trimmed September, 1896.

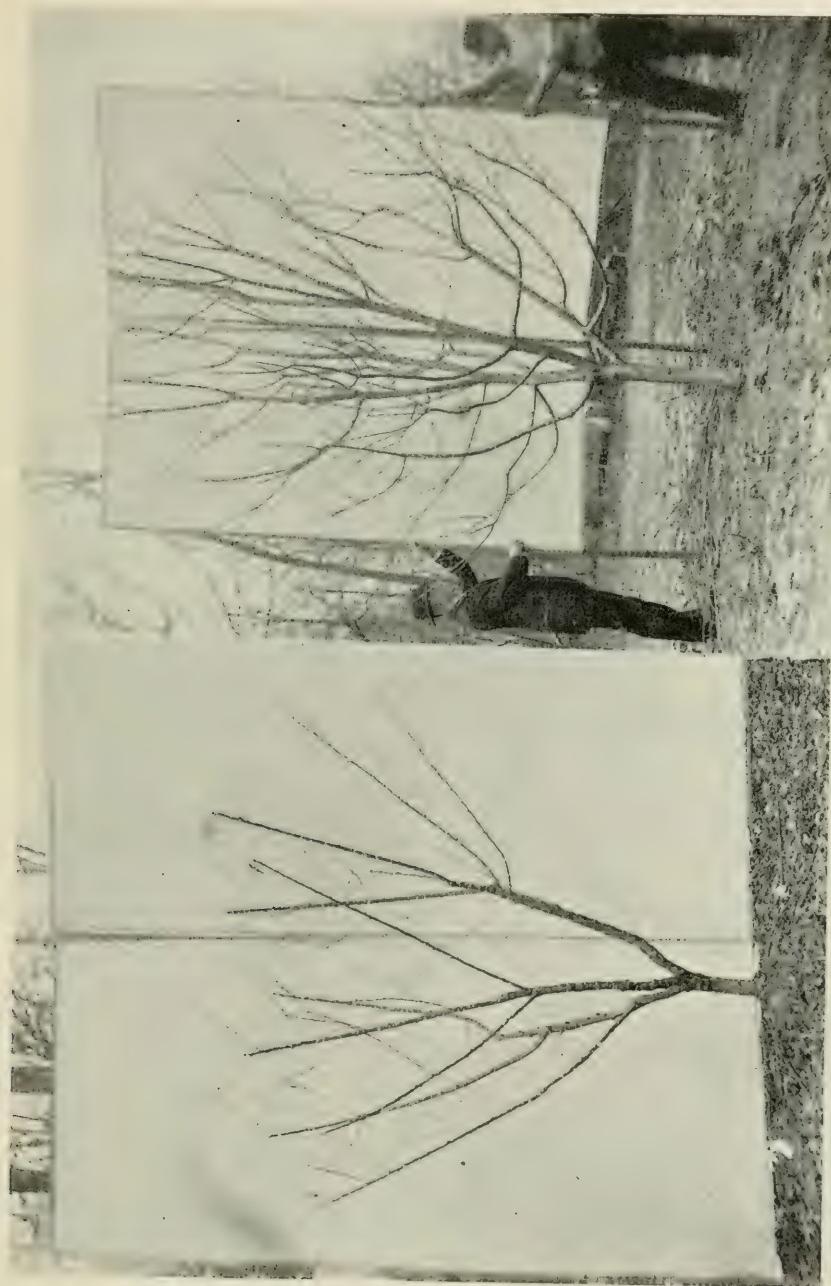


FIG. 2.—Peach, set 1892, photographed October, 1896, after trimming. Lombard plum, set 1892, photographed October, 1896, after trimming.



FIG. 3.—Peach set spring of 1894. Photographed October, 1896. Before and after pruning.



FIG. 4.—Three-year-old peach, before and after pruning.



FIG. 5.—Four-year-old Burbank plum, before and after pruning. Has borne two full crops.

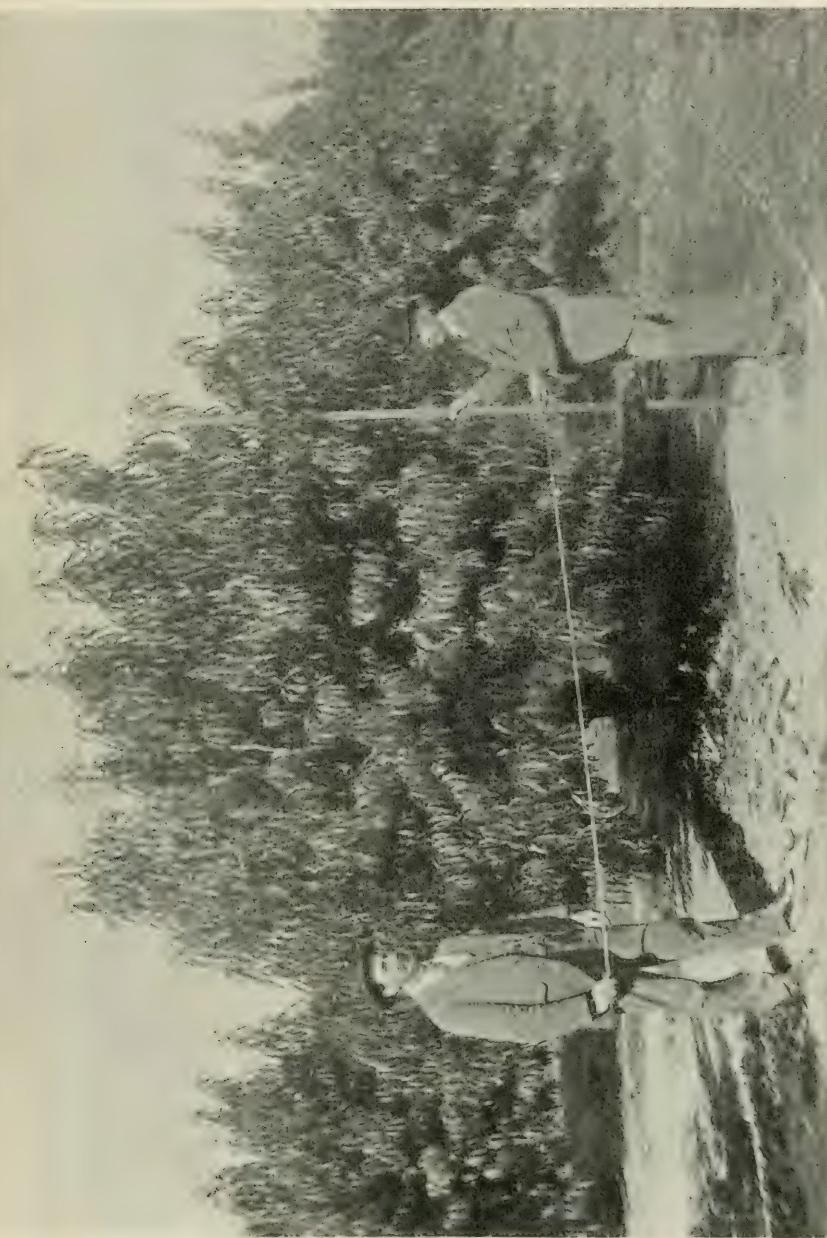


FIG. 6.—*Variety Lewis*, in peach orchard of R. Morrill, Benton Harbor, Mich. Planted April, 1894; photographed Oct. 1, 1896; extreme height, 12 feet; extreme width, 14 feet; diameter of body, 4½ inches; diameter of bore, 18 inches; bore full crop in 1896.

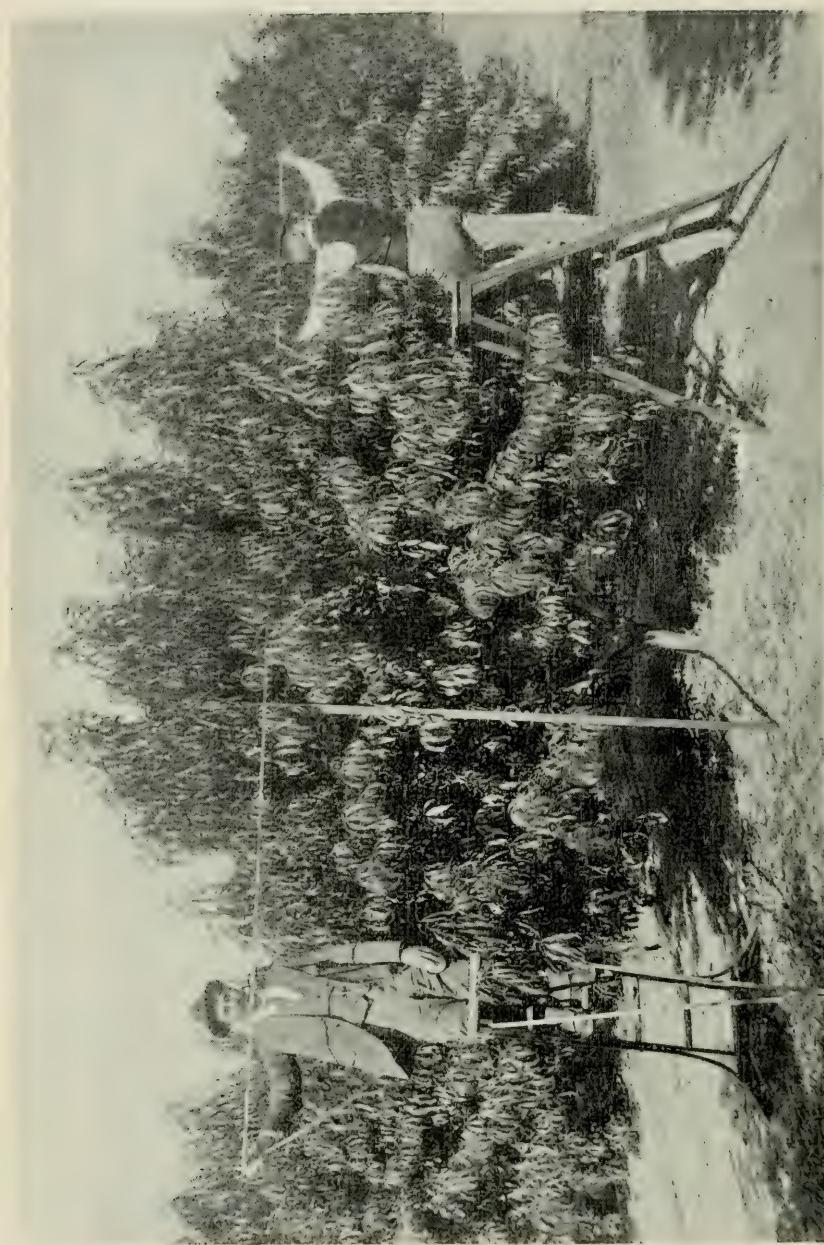


FIG. 7.—View in peach orchard of R. Morrill, Benton Harbor, Mich. Variety, Gold Drop; planted April, 1893; photographed Oct. 1, 1896; height, 12 feet; width, 20 feet 4 inches; height of body, 14 inches; diameter, $5\frac{3}{4}$ inches. Full crop in 1896.



FIG. 8.—View in peach orchard of R. Morrill, Benton Harbor, Mich. Three-year-old Gold Drop Orchard. Rows twenty feet apart.

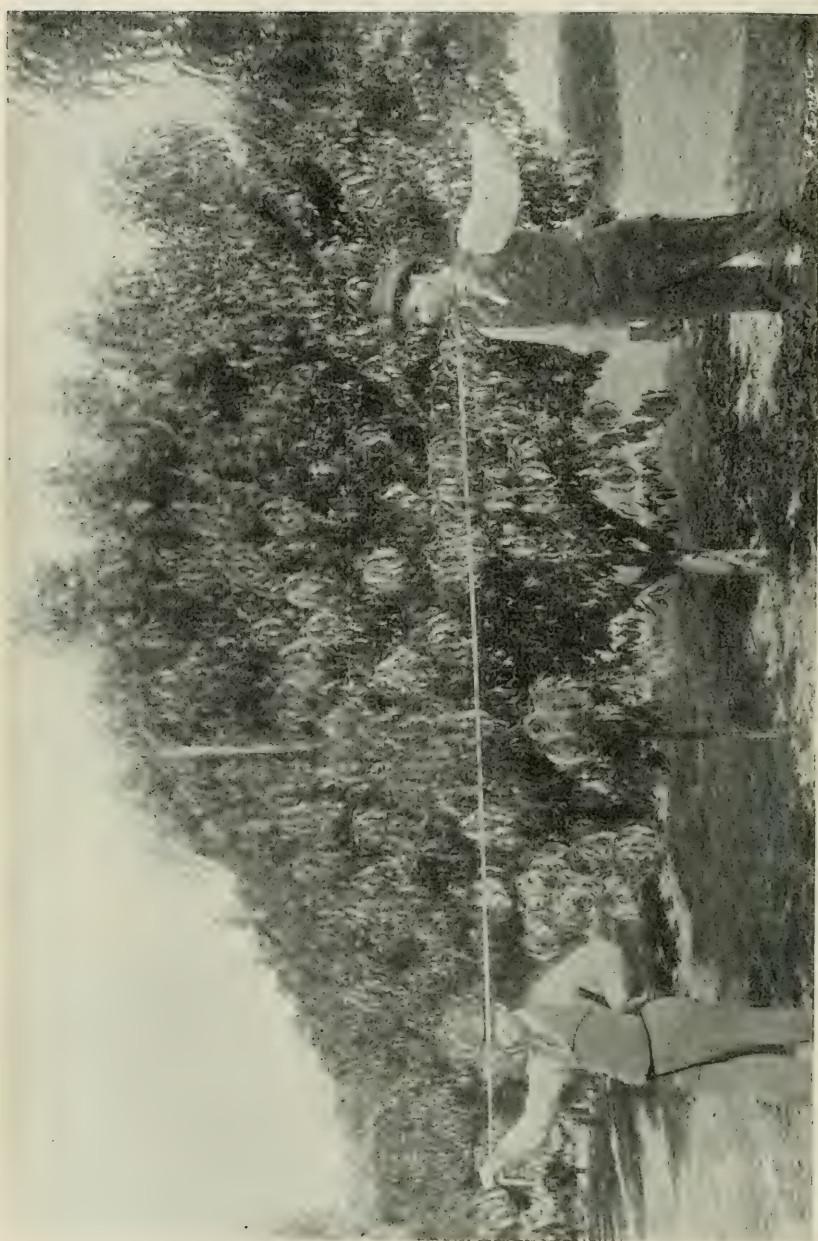


FIG. 9.—View in peach orchard of R. Morrill, Benton Harbor, Mich. Typical tree in four-year-old Elberta orchard. Height, 12½ feet; width, 17 feet; height of body, 21 inches; diameter, 6½ inches. Crop on this tree in 1895, about one bushel; in 1896, over five bushels.

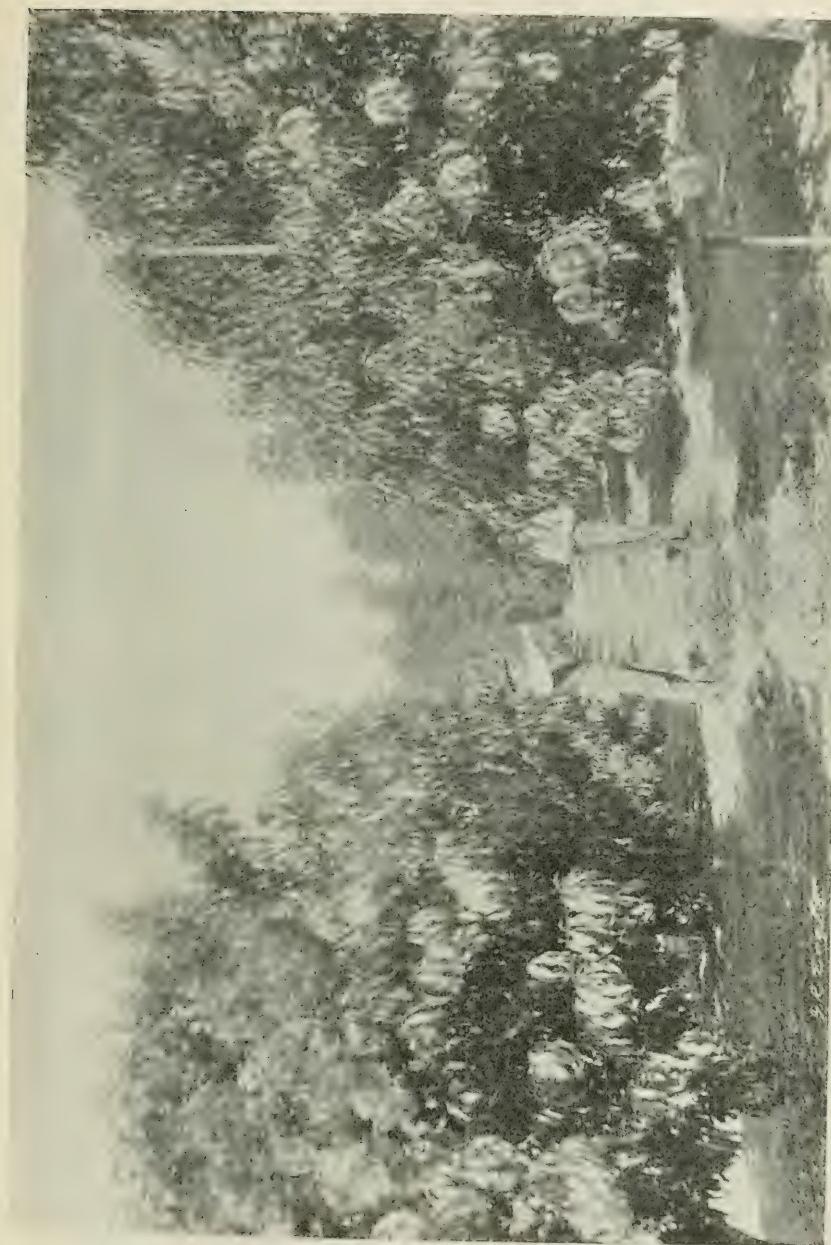


FIG. 10.—View in peach orchard of R. Morrill, Benton Harbor, Mich. Four-year-old Elberta orchard, rows twenty feet apart. Forest in background.



FIG. 11.—View in peach orchard of R. Morrill, Benton Harbor, Mich. Four-year-old St. John orchard, taken from elevation, showing packing-house in shade of native forest.



FIG. 12.—Eight-year-old peach orchard, showing regular annual pruning since one year old. Has borne six full crops requiring thinning.

able, this tree would set twenty or more times as many peaches as would be required for a full crop. Note carefully how we have trimmed this tree. We show you the first motion in this kind of trimming. Go on the ladder and cut back all leading growths one half to two thirds; then thin out the smaller bearing branches as you see. Now, if all the buds left survive the winter we will pick off more peaches than we leave on when thinning next June. This tree, or rather this block of 500 Lewis, averaged a little over one half bushel of fine peaches per tree in 1896, and was set in April, 1894.

Our next picture, No. 4, shows a tree set in the spring of 1893, which has borne two full crops of fruit. It is of more spreading habit than the preceding one, but you will observe the same general lines of trimming. At this age you will begin to observe one of the strong points in this system of pruning; *i. e.*, the noticeable thickening and stocking of body and main branches, and the large, strong formation of the crotches. These trees seldom or never split down, no matter how heavily loaded, and I never have a prop in my orchards.

Our next picture, No. 5, shows you a Burbank plum under same treatment, which I find just as desirable in plum culture as in peach.

These samples are, no doubt, enough to impress you with the plan or system of pruning which I practice and advocate; and I will now show you some views in this same orchard in full leaf, that you may more fully see the results.

Cut No. 6; variety, Lewis; planted April, 1894; photographed October 1, 1896; extreme height, twelve feet; extreme width, fourteen feet; height of body, eighteen inches; diameter of body, four and one half inches. Bore full crop in 1896.

Cut No. 7; variety, Gold Drop; planted April, 1893; photographed October 1, 1896; height, twelve feet; width, twenty feet, four inches; height of body, fourteen inches; diameter, five and three quarters inches; full crop in 1896.

Cut No. 8; view between rows of Gold Drop, set twenty feet apart, April, 1893; picture taken to show strength of growth, trees meeting across the row.

Cut No. 9; shows typical tree in four-year-old Elberta orchard; height, twelve and a half feet; width, seventeen feet; height of body, twenty-one inches; diameter, six and three quarters inches. This tree was set in spring of 1892, bore some fruit in 1894, about one bushel in 1895, and over five bushels in 1896.

Cut No. 10; view between rows in four-year Elberta orchard, designed to show the uniform character of the trees.

Cut No. 11; shows view in four-year-old St. John orchard, with packing-house in shade of native forest, and the pleasantest spot on the farm.

Cut No. 12; shows a general view of an eight-year-old orchard that has been pruned according to the plan detailed here. Notice where the growth was cut last spring, and see the amount of new growth following an enormous crop of fruit. This orchard has ten acres and has produced six full crops, and has made a net profit of over \$1,100 per acre during that time, or a little better than \$137 per acre per annum.

If you have observed carefully you have noticed that these orchards have had absolutely clean, level culture; but one help they have had that you could not see, and that is, liberal dressings of wood ashes and bone. I have talked to you entirely on pruning, but I hope no man will carry the idea away with him that pruning is alone responsible for the fine specimens I have shown you, as it is really only one of several details of care that are needed, as a whole, to grow a really first-class orchard.

I have given you exact measurements in several instances, for two purposes: (1) to demonstrate that pruning, on the lines laid down, stocks and strengthens a tree; and (2) to give you an opportunity to measure what you consider good trees of the same age, for comparison.

My excuse for offering you this lecture is that I firmly believe that in view of the enormous planting of peach trees making in all the peach regions of the United States, the brutal law of survival of the fittest must soon be put into operation, when I would like to see our own Michigan come up smiling with model orchards and men who understand the care and handling of fine peaches so well that they can still find profits even after their less intelligent or less industrious neighbors are swept out of competition by their own negligence or the hand of providence.

Now let me sum up what I think are the essential requirements for successful peach culture.

1. Proper soil and location.
2. Thorough culture, with very little cropping with other crops.
3. Liberal fertilization with proper fertilizers, viz.: phosphoric acid and potash.
4. Careful pruning as detailed, always done when growth is dormant.
5. Careful thinning when crop sets too heavily.
6. A man who is intelligent, industrious, and progressive; an honest man, who has the moral courage to follow the golden rule during peach harvest.

Of such material must the winner be.

OBJECT AND LIMITATIONS OF PRUNING.

BY MR. R. M. KELLOGG OF THREE RIVERS.

The object of pruning is to induce fruitfulness by concentrating the strength of the tree upon its fruit buds and limiting those to the ability of the tree or vine to bring its fruit to high perfection without approaching the line of exhaustion.

An orchard or berry patch properly pruned or tilled will, under reasonably favorable climatic conditions, produce a heavy crop of fruit of the finest grade every year. What we call the "off" year is the time required to recuperate from the severe strain of excessive pollination and seed-bearing. If the tree is limited to its ability to perfect its fruit, this "off year," or more often a series of years, of unfruitfulness would not be required.

It is claimed that trees and plants have no nervous systems and are insensible to either pain or congenial surroundings. We have no means of knowing to what extent this is true. Indeed, we know nothing of the forces that send the sap up through the tree. We only know that the hair-like rootlets suck up the moisture of the soil, which is charged with certain mineral substances that pass up from cell to cell through the body of the tree, until the leaves are reached, where they are assimilated and combined with certain gases taken from the air. The leaves of the plant perform the same office as the stomach and lungs of an animal.

It has been shown that fully ninety-five per cent. of the weight of the tree or plant is thus gathered from the atmosphere through the leaves. When we burn wood, we separate carbonic and other gases, which go into the atmosphere as smoke. These gases are again gathered up by other trees and vegetation, and are separated by the wonderful cell tissues of the leaves and combined with minerals sent up by roots, and sent along down under the bark, where they are appropriated in building up the wood cells which constitute the growth of the year. We know this process of assimilation can only go on in the rays of the sun or bright light, and that during the night and in deep shade this process is partially or wholly suspended, according to the degree of light. We find abundant evidence of this in the behavior of trees in deep forests. All the lower limbs fail to perform their functions and die; small shrubbery dies out or makes feeble growth, while the tall trees, forcing their leaves up to receive the sun's rays, grow vigorously. It seems to have been one of the wise provisions of the creator to so incline the earth's axis that the sun should rise well toward the northeast, pass around to the south, and finally sink away in the northwest, that its rays might touch the foliage on all sides of every tree or plant. Careful investigations show that strong fruit buds will not form in densely shaded parts of the tree. Fruit will grow in shade because it only appropriates the food digested by the leaves. No one ever saw a large, luscious peach

or cluster of grapes unless the foliage on its branch was well developed and in the full light of the sun's rays. It is true of all fruits, even down to those of the most tiny plant or shrub.

The tree must have its branches so trimmed that, while it shall be symmetrical and beautiful, its foliage shall be evenly distributed to receive the sun's rays. Assimilation of plant food in the shade is slow and entirely suspended in the dark. Large, open spaces are not required, and yet it must have free circulation of air, and, if deprived of it, would suffer the same as an animal confined in a close room.

The orchardist must have an ideal of the form he desires always in his mind. Standing by the tree as received from the nursery, he must in his imagination see it full grown, an ideal tree. He should cut away such limbs as will interfere, and by shortening induce other branches to start that the ideal shall be realized. This can not be accomplished by spasmodic cutting away. It must be done annually.

We must ever bear in mind that when a tree bears fruit it is breeding, and that excessive pollen secretions and seed-bearing renders the tree impotent as readily as in the case of an animal, and it seems to me this goes far in disposing of the theory of the lack of some kind of nervous system. It may not be so acute in all respects, but this exhaustion certainly does affect the whole constitutional vigor of the tree.

We have all observed that, in seasons of excessive bloom, when every twig was loaded with flowers, the fruit which followed was not only small in quantity, but gnarly and destitute of flavor; and not only that year, but for several years following. The tree has no power to impart to so much pollen a potency which shall impregnate the pistils with vigorous life; and, as all fruit grows as a receptacle in which the seeds may mature, the pulp or fruit will develop and take on high quality in proportion to the development of the seeds. The fact that the forest trees only bear large crops at long intervals, often being barren for years at a time, seems to furnish evidence that unrestricted pollen-bearing is the prime cause of unfruitfulness and the consequent weakness which induces fungi and many diseases. I would not think of setting strawberry runners or any small fruit plants taken from plants which had been allowed to shed their pollen unrestricted from year to year. Careful experiments have proven conclusively that maximum crops can not be grown from such plants. They should always be removed on spring-set plants as soon as buds appear and before pollen secretions take place.

Experiment has shown that limbs cut away early in the winter do not heal over as soon as those cut just before growth begins. Hence we may delay the removal of these surplus buds and limbs until just before growth begins.

Some years ago that prince of fruitgrowers, Mr. J. N. Stearns, had a pear orchard which bloomed every year but bore little or no fruit, and what it did produce was so poor in quality as to be worthless. He determined to graft it to other varieties. One row was selected and fully two thirds of each top was cut out for this purpose, and the remaining limbs were loaded with the finest specimens, the balance of the orchard, unpruned, bearing its worthless fruit as usual. Since that time he has

pruned vigorously by shortening in branches as well as thinning out, and has had, even in this year of demoralized prices, a profitable season, selling his fruit readily at the highest prices on account of its superior quality.

President Morrill exhibits here today some wonderful specimens and photographs of vigor of growth and perfection of wood that are marvels, and the fruit the past season was of the highest grade. I believe that in the discussions which shall follow this paper he will concede that his March pruning and shortening in to relieve the trees of pollen exhaustion has been one of the main causes leading to his phenomenal success as a grower of fancy fruit. I understand he has followed this system since the starting of the trees, and supplemented this with vigorous thinning of fruit to relieve the trees of the great strain of seed formation, so they were always in command of their full powers, bearing only the fruit they could bring to the highest perfection. I think he will also concede that this thinning and pruning caused the fruit to take on a much richer flavor and firmer texture.

Then, again, this early pruning concentrates the growth upon a few buds, which, under the influence of the early summer rains, make the principal growth before the great strain of seed formation begins. As a rule, very little growth is made after seeds begin to form, but, the size having been attained, the whole latter part of the summer and fall are utilized in maturing the wood and preparing for winter. All danger of late growth is largely avoided. A growth thus perfected will stand many more degrees of cold than an unrestricted tree.

We may now consider what are the limitations of pruning. We must again note the habits of the tree. There must be a perfect balance maintained between the root and branch. In the normal condition the amount of top corresponds to the amount of roots. If you find a large limb and dig directly under it, you will find a correspondingly large root. If we cut away the top and remove the foliage we destroy the means of digestion and bring the tree to the same condition of the dyspeptic. The roots gather the food and force it up for digestion, and it remains in that condition and greatly weakens the tree. How are we, then, to cut away the unnecessary branches? Nature has provided for this. During the fall months the tree stores up an immense amount of plant food in its wood, as a resource for early spring, for use before the ground is warm enough for the roots to act. In mid-winter, when the ground is frozen, if we train a branch of the grapevine in a warm, light room, it will at once proceed to leave out and make considerable growth, exhausting the resources in its wood cells before growth is suspended. I have mulched currants and gooseberries heavily in winter, and in the spring the leaves would attain full size while the roots were all frozen solid. The temperature of the air, and not of the ground, governed in starting the growth. I am satisfied roots do not gather food to any extent until the ground is quite warm. Now, we may take advantage of this and remove as much of the top as will equal this early growth. The draining of the stored supplies, and the growth already made, compensates for the parts cut away, and the whole action of the tree proceeds with entire harmony. I believe we may with safety and profit remove fully half of the previous

year's growth. It is better to keep within limits and moderation; and, if there are too many buds, I should resort to thinning rather than to excessive pruning.

If the orchard has been neglected, rendering it necessary to remove a great amount of wood at one time, I should mulch heavily the previous winter, when the ground was frozen deeply, so as to retard root action by keeping the frost in the ground as late as possible, that the early growth might be made on the resources of the tree and assimilation be provided for when roots begin to act.

In regard to summer pruning, when foliage is performing its work, I believe it is the greatest mistake. There may be a slight advantage in the wood healing sooner, but it does not compensate for throwing the tree out of harmony while in full growth, and pollen exhaustion is not guarded against.

Then in conclusion, let me admonish the orchardist that the secret of his success lies in maintaining high breeding or fruiting powers in the tree by restricting it to its ability, securing the growth early in the spring, utilizing the fall months to mature the wood for winter, keeping the branches so trained that the sun's rays shall render perfect assimilation in every leaf, and lastly an abundant supply of food and thorough tillage throughout the dry months of summer, that moisture may always be present, and he may with confidence expect large annual yields of the finest fruit.

DISCUSSION.

Mr. Kellogg demonstrated his method of pruning on some branches of fruit trees furnished by President Morrill.

Mr. Lyon: I quite agree with the chairman as to the value of the ideas communicated in this paper, but if I understood it fully there is one particular it did not touch, and was perhaps not intended to touch. There are two purposes for which pruning must be done. One is the growth of wood before the fruit season occurs; the other is the production of the fruit. When a tree is first planted the object must first be to secure a proper form of the tree, to secure wood growth, no matter how rapidly, provided it is healthy; that, as I understand, was not the purpose of this paper at all. I would like to impress upon all the idea that pruning for securing proper form of tree and of a proper wood growth in the right direction, must be upon an entirely distinct principle from the pruning required for the production of fruit. The principle of pruning must all be accepted upon the idea that the less pruning the better, so far as the actual amount of growth is concerned; I can not take away a single leaf from a tree without injuring the vigor and health of that tree just so far as the one leaf exercises an influence; and the more we take off the worse, so far as the actual amount of growth is concerned; but we must train that growth in the direction we need, in order to form a proper foundation for future purposes. It is this that I wish to bring out, the fact that we need to prune first with reference to the foundation of a proper head to the tree and the laying of a foundation for future usefulness afterward, and then the ideas that are so admirably presented in the paper come fully into use.

Mr. Wiley: I think Mr. Kellogg's paper is one of the best he ever read on the subject. He comes the nearest to it. Of course, a man can not get it all. I visited Mr. Morrill's orchard at a time when it showed what pruning did, and they had gone the nearest to the last point in pruning of anything I ever saw. The leaves were wider and longer on his trees, but the trees were not injured—they were just about as far as they could go without injuring; they were cut back and kept within bounds. The bodies were large and smooth, and the tops were cut more than anything I ever saw.

Mr. Morrill: Butchered, my neighbors say.

Mr. Wiley: Yes, butchered. They were well swept out, I never saw such sweeping out of tops, and heading back, in my life; but I saw two results—the foliage was double the usual size, and the fruit was double the size it naturally would have been if let grow the way they do in the bush.

Mr. Sherwood: I would like to ask Mr. Kellogg concerning a point that seems to be open to discussion a good deal now—the advisability of pruning before the last of March. I have experimented a little myself, this year, to see how it would result next year. My ideas are in accord with Mr. Kellogg's, that limbs that are trimmed in the winter and allowed to remain dormant before the vitality of the tree starts, are a hindrance to the tree's growth. That is my view of it, and I think it agrees with Mr. Kellogg's. I would like to know if Mr. Kellogg ever experimented along that line so that he knows whether it was a detriment to the tree to trim in December or January, or any time it is convenient and the weather permits?

Mr. Kellogg: I can not draw on my own personal experience for that; but in the trees I have seen pruned in that way I have always seen a long black stub, a portion which was killed back, and it is difficult to get growth there; while, if pruning is done just before growth begins, the wound will be covered and new branches form easily.

A Member: I would like to ask if they would follow the same system of pruning in plum culture? This seems to be especially in regard to peaches.

The President: I do, successfully.

Mr. Ramsdell: Does this apply entirely to peaches, this winter pruning? Would you prune peaches in the winter time?

Mr. Kellogg: Now, I would rather Mr. Morrill would answer that question, because he has been at this business, and we don't want theory; we want practical work; but, in reference to the question as to whether this theory will apply to peach orchards, I simply say that it applies to every tree that bears fruit, clear down to the blackberry and raspberry or anything else. I am going to have an apple orchard and that is the way I am going to prune it. I am going to prune it every year, I am going into the trees and thin out everything so that the sun shall have free access everywhere in the apple tree, just as it does in the peach tree. Mr. Morrill has pruned his pear trees and apple trees, and so has Mr. Stearns, and I would like to hear from him on that question. He has been practicing it with great success.

Mr. Stearns: I was just going to answer this gentleman in regard to plums. It is just as applicable to plums as to peaches, that first

pruning. We do not find it practicable to thin plums, it is too much work; it will not pay.

The President: Are you really sure of that statement?

Mr. Stearns: I am, so far as Lombard is concerned. I have tried it. If you have your own help, so that it does not cost you anything, it will pay to thin; but if you have to hire it done, at the present prices of fruit it will not pay. Two years, especially, my plums were affected quite badly on the northwest side of the trees, by a storm, and I was afraid the pickers would not discriminate in picking, but would put those in with the perfect fruit, and so I hired pickers to take those off; and the trees that I thinned cost me more for help than the value of the balance of the fruit that was not affected. But you can do it by this process of pruning.

Mr. Post: Now, I have had a full crop of plums for four years in succession, which is rarely the case; if you do not do something, either thin by picking off or by pruning, you will not get a crop of plums oftener than every other year, because the plum is a fruit that bears heavily when it does bear, especially the Lombard; and by the system of pruning that has been illustrated here you can get a good crop of plums every year. I have found it to as great advantage to the pear as to the peach. I practice on all fruits, for that matter, this system of heading in or concentrating the vitality of the tree, and it must be done if you expect to get good fruit, unless you fertilize very heavily and give plenty of irrigation in dry seasons.

The President: What do you say about Judge Ramsdell's question as to winter pruning of different fruits?

Mr. Stearns: I would not do pruning of anything until March.

The President: What do you base that on, experience or information?

Mr. Stearns: On experience, and the way I got the idea was in doing grafting in winter in apples and in pears. If you get anything like a severe winter you will find that the branch from which you cut scions will be killed back from an inch to six inches, where you took the scion off, and of course there would be the same result in pruning the trees.

The President: That was on what?

Mr. Stearns: Pears and apples, and on peaches and plums it would be still worse.

Mr. Ramsdell: I asked the question particularly in regard to peaches, because the discussion had taken a range without excepting peaches as to winter pruning. Some years ago, when I first went to planting peaches, I planted an orchard of about 500 trees, and in our country, in those years particularly, we had deep snow—snow three or four feet deep. The trees had a fine growth, about the middle of November, and I went out and pruned the limbs nicely so that they would not break down in the snow. The next spring (although those trees were covered with snow, so that it could not have been the severity of the winter) every one of them was dead, and I laid it to pruning in the wrong season of the year.

Mr. Cook: I would like to ask if this system of pruning has any effect as a preventive of the decay of plums on the tree?

Mr. Stearns: I have very little trouble with plum rot. I attribute what I have pretty largely to poor spraying. I used to have a great

deal of trouble before I used Bordeaux mixture, but I have very little trouble now with plum rot, but I can not see wherein it would make very much difference in regard to the pruning—whether it would help or hinder rot.

Professor Taft: So far as rot is concerned, it seems to me that this thinning out will save the strength of the trees so that they will be less likely to have rot, and I believe also that some of Mr. Stearns' freedom from rot is owing to his use of wood ashes and things of that kind; and Bordeaux mixture, I am convinced, if properly applied, will greatly reduce it. I would first have a strong, healthy tree, and pruning of course assists in that.

Mr. Stearns: There is one point in regard to this spraying that I consider very important, in regard to rot of the plum and the heading off of the fungous diseases, of which I would like to speak; and that is, spraying before the trees leave out. I want to emphasize that. I consider that one spraying, thoroughly done then, is worth more than three at any time afterward. It prevents scab or anything of that kind on the tree. That is my experience, that one thorough spraying before the trees leave out at all, before they blossom, is much better than several later sprayings; and it should be done very thoroughly. Have the solution reach every part of the branches and body of the trees. If you do not, it amounts to but very little.

Mr. Kellogg: This year, Mr. Morrill, they had a great deal of trouble about peach rot, in your vicinity. I would like to ask you if you found that the peaches on trees pruned in this way rotted as badly as those that were not so pruned. Does this process of shortening in strengthen and build up a better texture in the fruit, that will enable it to resist the fungus that causes the peach to rot?

The President: I am very much undecided in that. I feel as though, in my own trees, they suffered perhaps worse from rot owing to their dense foliage. Some of the gentlemen remember, who were down there last spring, that the foliage is extremely dense where trees are treated in this manner, and that under the peculiar condition we had of dampness and heat—a shower every day and a temperature of nearly one hundred degrees—the foliage having prevented free circulation of air, was against that. I believe that is true, because, on my older trees, which had ceased producing that very rank growth after bearing several crops, the rot was not nearly so bad. At the same time, if I had been able to reach all of my peaches at the period in which most people pick fruit, some time before it is ripe, I should have saved them; but my policy has been to pick nothing but ripe fruit, and there was a condition existing nearly a week in which I think I lost in four days a thousand bushels of peaches by rot.

Mr. Lyon: Do you mean by ripe fruit that it is actually mellow?

The President: No, not mellow, but just as near it as possible and still be sound. Under these conditions a man could not work half the time, on account of the showery periods, and the fruit ripened extremely fast.

Mr. Rork: So far as the season of pruning is concerned, we never prune anything in the fall. Many were doing it, and told us in the beginning to do so. Nature, when she gets into winter quarters, says to me she does not wish to be disturbed, and she never allows herself to

be disturbed if she can prevent it. So I never prune in the fall, and never would, although everybody else did, and I have seen better results from spring pruning than from fall. I study nature largely in all those things. Again, plum rot, it seems to me, comes to the most vigorous, finest trees and finest fruit, though as a rule, of course, the constitution and the vigor of the tree determines its ability to resist, and its power to produce the best and most substantial fruit; but sometimes real thrift, and all that, seems to invite rot. I can not say just why, but it seems as though it did sometimes. Then, as to pruning, I have found that, the foliage being dense and large, consumes greatly the strength of the tree, in dry times especially, and you will get smaller fruit of the same kind with heavy, thick foliage, than you will with thin. Thin it off, cut it off. I wish some down our way could have heard Mr. Kellogg's views. They have this way of thinning their trees: They wait until they are fairly set, fruit about as large as hickory nuts, see that they are going to have a fair crop, and then, to save picking them and save trimming, at the same time, they go through and cut them off. They say they brought it up from the Watervliet district, and they tell us mossbacks that they know how, and they trim and thin at that season of the year. Nature does not like to be disturbed too vigorously just when she is vigorously growing.

Mr. Weed: Mr. Rork says that nature always guards against this breaking down. Now, nature, or nature's forces, does break down trees in the fall of the year, and of course the weight of the peaches breaks the limbs off, and our heavy storms on the lake shore break the limbs off very materially. Now, I have never seen any particular damage from breaking limbs off from the trees. Such trees always seem to have more vigor the next year than those adjoining that were unbroken. It certainly will do more damage to break a tree down in September, October, or November than it would to trim it at that time or later, it seems to me. Why is it that it should be a detriment? I think it does not do such a material amount of damage as it does to wait too late in the spring. In large orchards where we depend upon skilled labor to do trimming, it is sometimes a very difficult matter to get men to trim thoroughly, enough of them to do it, consequently a good many orchards go untrimmed; that is, some of them do—mine, for example. I could not get men to trim the trees. So I wish to know if there is material damage enough in winter pruning, or sufficient to make it an object to leave it till spring; and it does seem to me that I had trees in my own orchard, and I have noticed trees this summer in Mr. Taylor's orchard (he is a good fruitgrower in our section) that had been broken. I noticed very handsome fruit and very handsome foliage on the trees, although nature did not prune them just exactly, perhaps, as we should have done. It seems to me that nature, or nature's forces, occasionally does prune trees for us quite heavily, and I have failed to see any great damage.

Mr. Rork: I do not advocate leaving trimming to nature, though nature provides somewhat for that. But I do advocate not disturbing nature when she has gone into winter quarters. If the breaking of a tree by wind is no harm, let us have a few more tornadoes. My brother might discover that there are some violent forces in nature that are not so natural as they are unnatural, and nature does not break nor tear off

her limbs purposely to benefit herself. Anybody that understands it will know better than that; it seems to me that anybody who understands natural things will know that. Now, in the spring I would not wait until the sap was dashing up and down the trees, but when the warm sun comes a little, and the bark is a little softened and the sap just begins to think of starting, take them then, and in a moment they are healed. If you are going to cut my arm off I will choose to have it done in warm weather.

Mr. Sailor: I commenced about thirty years ago to raise peaches, and I have followed the plan of cutting back one third to one half. I begin in December and work until March, and I never could see a particle of harm. I never saw a particle of trouble from winter pruning, commencing in December. I have followed the Downing principle for a number of years, and I never saw any trouble in pruning back one third to one half.

Mr. Ramsdell: My orchard is on Grand Traverse bay. It is in latitude forty-four degrees and forty minutes north, and perhaps what would be a failure there might not be somewhere else; but if I prune a peach tree in October or after that time, that is a dead tree sure, next year. If I prune them and take the limbs that have been broken by either storms or weight of fruit, as soon as the fruit season is over, I find they grow out thriflily, and it is but little damage to the tree. That is a little in excess of your kind of pruning, but in that region of the country, winter pruning of the peach tree, or late fall, is sure destruction to the branch or tree that is pruned.

Mr. Weed: I merely ask for information. I will state that my orchard is on high ground, and is exposed to the lake, and my orchard is broken down a great deal. I have failed to notice any material damage from it. As regards a man's leg, of course, if it should be broken off, and he should survive, he would get more strength in the other leg, anyhow, and it is the same with a tree.

Mr. Ramsdell: There is another difference in our region. Our ground does not freeze in winter, the snow keeps it from freezing, so that roots are in moist, unfrozen ground all the time. That may make some difference, as compared to other places where the ground freezes, and there is no circulation of sap.

Mr. Taylor: I have only a word on this question. It is not many years ago since, I think in a meeting of this society, I heard very strongly advocated by some men that June pruning of the apple was the best, because the new growth would soon cover where the limb was removed. I have found that that time of year for pruning was more fatal than any other time that I could trim an apple tree. I have looked at some apple trees trimmed in November, thoroughly trimmed, and I have never seen any ill results from it. In fact, they have done as well as those pruned in any other time of year that I could name. I have been in the habit, for a number of years, in order to give my men work through the winter, of trimming my peach orchard through the winter whenever the weather was suitable; that is, sufficiently mild for a man to work with ordinary winter wraps, and I have never seen a tree damaged by winter pruning in my peach orchard, young or old; and I see no evil results from

it, neither in the bearing of the tree nor in the damage done by the winter. Notwithstanding this, I accept the presentation of the articles and the remarks made upon them in their localities. I fail to see in my own experience any evil results, and great benefit accrues in the employment of my help.

Mr. Ramsdell: Where is your orchard?

Mr. Taylor: On the lake shore in western Allegan county.

Mr. Morrill: I would like to say a word regarding Mr. Rork's statements a few moments ago. He rather inclines to follow nature more closely than some of us have found profitable. I believe in studying nature, as he says; but, after studying it, I like to go and do as I please about it, and in some instances I have found that nature was not doing the best for the tree in hand. A peach tree, I think, invariably overdoes itself. I believe that the root of the peach tree is not able to support the amount of top that it will grow under any sort of normal condition. There is a question of when and how to take away what is really surplus. I have a friend near me who has about a hundred acres, and he has practiced just what Rev. Taylor has practiced for years—five years at least. His orchard is all pruned when spring opens; the brush is usually burned, if he has an open spell, and everything is done in his orchard that can be done in the winter. He tells me he has seen no bad results. I don't know how close an observer he is, but he is a very successful man, so I have tried the experiment. On theoretical grounds I have been afraid to do it. I trimmed a hundred trees this fall, and trimmed all my plums, believing they would stand it better if there was any damage resulting. But going back to this plan of cutting away peach trees, which Mr. Rork seems to think would be necessarily harsh, and perhaps not profitable, as he seems to have discovered somewhere that the fruit was not so large where this enormous growth was made. I have found, in my own practice, when I have cut away severely, that while I do increase the size of the top very materially I also increase the size of the fruit. I wish to impress upon you what I believe to be a fact, which Mr. Kellogg expressed in his paper, that the important thing is to do this previous to pollination. Then I should follow it up with something which he did not consider. I would thin previous to bud formation. Set those two things right down in your hat, where you can always see them when you take your hat off—that you must do that in peaches if you expect to get the very best development of fruit. I am satisfied that is true. I am satisfied that the leading growers of the state will tell you so, I am satisfied of it from my own experience. Mr. Morrill here demonstrated his method of pruning.

RECENT WORK AMONG OUR INSECT ENEMIES.

BY PROF. M. V. SLINGERLAND OF CORNELL UNIVERSITY.

The science of growing fruits, flowers, and vegetables, or horticulture, and the study of habits of insects for the purpose of discovering when and how to best destroy them, or economic entomology, these two sciences are each year coming to be more and more mutually helpful to each other. The progressive and successful horticulturist now realizes that he should know something about the common insects which habitually infest the crop he is trying to grow; and, furthermore, that he should also keep in close touch with those who make a business of studying these little foes, so that he may, by correspondence or otherwise, quickly avail himself of and understandingly use whatever information may be given when an unfamiliar or new insect pest threatens his crop. On the other hand, the economic entomologist can usually draw safer and more practicable conclusions in regard to methods of fighting insect pests if he can call in the aid of the experienced and successful horticulturist. A horticulturist who "sees what he looks at" can often furnish valuable information as to the behavior of insects in their native haunts. Insects will not always deport themselves the same in an entomologist's cage as they do in the horticulturist's field; thus, cage experiments should always be verified and supplemented by field observations.

I wish horticulturists realized how valuable a few careful observations, which they oftentimes might easily make, are to the entomologist when he is asked to diagnose an attack by an unfamiliar insect. Always send plenty of specimens and accompany them by copious notes of what you have seen the creatures do on their native heath. Do not be afraid to bother your state or experiment station entomologist (or that of any other state, for that matter) with questions about your insect pests. These men are paid to serve you to the best of their ability as often as you feel you need their knowledge, and most of them are glad of the opportunity to lend you a helping hand. But do not expect the entomologist to know all about any insect you may send him. Although much has been written about injurious insects and how to combat them, there is still a great deal to be learned about even our most common and apparently best known insect foes.

In short, then, horticulture and economic entomology should go hand in hand, the trained student of insect life furnishing the necessary scientific knowledge of the enemy's habits, and the expert horticulturist supplementing this with, and rendering it practicable by, suggestions drawn from his knowledge of the natural conditions surrounding the insect.

Since 1841, when Dr. Harris gave us our first economic entomology in his well-known "Treatise on the Insects of Massachusetts," the science has made rapid strides. The earlier writings were signed by such familiar names as Harris, Fitch, and Walsh, and veritable mines of information are their reports. However, the addition of Paris green and kero-

sene emulsion, and the modern spray pump and nozzle, to the earlier insecticidal batteries, soon revolutionized recommendations regarding the destruction of our insect foes. Thus the more recent writings of such well-known entomologists as Riley, Comstock, Cook, Lintner, Forbes, and Howard have not only added much to our knowledge of the habits of insects, but their recommendations for combating them mark a great advance in the science, so far as it concerns the horticulturist.

The establishment of experiment stations in nearly every state gave a great stimulus to the scientific study of agriculture, and in no other branch has this been more marked than in economic entomology. The working corps of many of the stations now include a trained observer of insect life, and a great mass of literature has already resulted. Much of this material has been hastily compiled, oftentimes the mistakes of earlier writers being repeated, and is thus of little value; but there are many good compilations seasoned with common-sense, and such have a legitimate place in our literature. The work has been growing better each year as the observers became more skillful, and now there are many valuable additions to our knowledge of injurious insects coming from the press monthly in the form of experiment station bulletins. These publications are free to any one who may take the trouble to ask for them, so there is no excuse for horticulturists not keeping posted in these matters. Bear in mind, however, that, try as hard as he may, the entomologist can not always present his knowledge in such a way that the horticulturist can at once put it into practice, unless there has been a mutual interchange of ideas and suggestions between the two. It is just this "rubbing together" of each other's ideas that both the economic entomologist and the horticulturist need to render the work of the former the most useful to the latter. This is sometimes well illustrated in the recommendations made to combat certain insects. The substance recommended may be all right, but the time when or how to apply it may be omitted or left indefinite; or it may be impracticable when tried under the horticulturist's conditions; or the whole thing may be absurd. There has been too much guesswork in the recommendations for fighting insects; they often need to be more strongly flavored with common-sense. But, as Barnum so long ago demonstrated, a humbug often has a peculiar fascination for the American people; and this has been recently shown in the line of insecticides.

A "Tree Inoculation Company" in the eastern states claims to render a whole tree safe from the attacks of any insects, more especially the elm-leaf beetle, by the aid of a wonderful compound which they insert into a hole bored in the trunk. They made thousands of dollars by charging seventy-five cents or more to treat each tree, and they realized \$6,000 for the right to use the compound in New Jersey. A chemical analysis of this secret and mysterious substance showed that it was nothing but sulphur disguised in color by the addition of carbon. Last year thousands of pounds of the "American Soil Renewer and Insecticide" were sold in Minnesota. When sown on the field it was guaranteed to kill every chinch bug and to so impregnate the soil that the insect would not again enter the field. The chemist showed that it was simply a compound formed by combining a large amount of salt with

a very little land-plaster and hellebore. Still another patented humbug found its way into the market last year. It was claimed that if seed potatoes were treated with "Siebner's Potato Bug Exterminator Compound," the bugs would be prevented from destroying the vines, and the quality and quantity of the crop would be improved. It seems almost needless to add that careful tests by two experiment stations showed that this compound was entirely worthless for the purpose recommended. The lesson to be learned from these illustrations is to exercise a little common-sense when approached with a panacea for all the ills to which your plant may be heir, even though backed by the testimonials of hundreds of sufferers.

The immortal words of Walsh, written in 1867, are as applicable today as then: "Long live King Humbug! He still feeds fools on flapdoodle!" It is true that some of the patented insecticides have merit, but usually what little they have is derived from the proportion of some of the standard insecticides used in their preparation. Most of them are simply adulterations of standard, unpatented, and less expensive insecticides. Wait until a substance has been thoroughly tested by several of the experiment stations and has received their unqualified approval before you invest in it.

The "acme of perfection" has not yet been reached in our standard insecticides, like Paris green, London purple, kerosene emulsion, etc. Experimenters are still searching for something cheaper or more effective than these. In the magnificent fight which the state of Massachusetts is making against the gypsy moth, almost every poisonous substance which chemists can concoct or suggest is being tested. It has been demonstrated that one of the caterpillars of this insect may withstand uninjured an amount of arsenic, in proportion to its weight, equivalent to $12\frac{1}{2}$ times the fatal dose for a man in proportion to his weight. Arsenic has also been found in the bodies of pupæ, and even in female moths, reared from poisoned gypsy moth caterpillars.

"Gypsinc" or arsenate of lead is a very promising arsenical compound which has been recently brought out in the work of the gypsy moth committee. As yet, horticulturists have used it but little, but where it is desirable or necessary that an insect quickly get a large dose of poison to facilitate its death before it can do much damage, it is proving a valuable addition to our list of poisonous insecticides. It has been used quite extensively against the elm-leaf beetle in the eastern states. It is very doubtful if it will ever take the place of Paris green for general use, although it costs less per pound and will not burn the foliage even when used very strong. It has to be used three or four times as strong as Paris green to get the same effect, thus rendering the final cost about the same. From experiments made during the past summer on gypsy moth caterpillars, the indications are that another arsenical compound known as barium arsenate is the most successful poison that has yet been tested. This substance is not yet in shape for recommendation in ordinary use, and its preparation is somewhat complicated.

A modification of Paris green, known as arsenite of copper, which is less expensive and more easily kept in suspension, has recently been tested by Mr. Marlatt of the United States department of entomology, and he reports it equally effective with Paris green. If its apparent

superiority over Paris green is fully demonstrated by further extensive experiments, it may largely replace the latter. In his experiments during the past summer, Mr. Marlatt thinks he has also found another premising arsenical insecticide in the *arsenite* of lead ("Gypsine" is the *arsenate* of lead).

Among the developments in the line of insecticides for sucking insects, whale-oil soap is destined to come into more general use. Used at the rate of two pounds in a gallon of water, it seems to be the most effective substance yet found for the San Jose scale here in the east. Thus, there are a few recent developments in the line of insecticides, and these show that our experimenters are on the alert for any improvement on our present standard "remedies."

We doubtless lead the world so far as improved methods for fighting insects are concerned. Paris green is only just coming into general use in England and other foreign countries. Our leadership is well illustrated in the development of our present spraying and other insecticide machinery during the past fifteen years. Our manufacturers are today making the simplest, cheapest, and best of such machinery. The first, weak, short-handled, "backaching" pumps fast disappeared with the advent of those more powerful and easier to work; and yet the restless, ingenious Yankee fruitgrower was far from satisfied. He must have a pump of more power, with a better agitator; and hundreds of manufacturers all over the country strained every nerve to be the first to meet the demand. Your worthy president, doubtless "Bent on Harbor"ing no longer the old-style pumps, has recently "Eclipse"ed them all.

But the end is not yet. All realize that the science of spraying has come to stay. It has become evident that the scheme to shift the work of pumping upon the horse—the horsepower sprayer—is not adapted to orchard work; it may do fairly satisfactory work in a potato field, or possibly in some vineyards. Several of our larger orchardists now depend upon small steam or gasoline engines to furnish the necessary power to throw at one time several good, strong sprays. When competition has cheapened these expensive power machines, they will doubtless come into general use where spraying is done on an extensive scale.

There seems to have been few new developments in the line of nozzles recently. The Vermorel in its various combinations and the McGowen still remain the best for general purposes.

Many horticulturists are very conservative in regard to spraying. They require an object lesson a year or more long, by one of their more progressive neighbors, before being convinced of its efficacy. Unfortunately, some go too far and trust to the spray alone to produce a good crop, forgetting the equally necessary operations of feeding and cultivating the trees. A tree that is habitually unfruitful can not be made to bear by any spray, but the spray may act as an insurance policy on a good setting of fruit; and it will also tend to insure a better crop the following season. If the foliage be kept healthy during the summer with the spray, it can mature more and better fruit buds in the fall for the next season's crop. Much work yet remains to educate the mass of horticulturists up to the philosophy of spraying. Your own former Prof. A. J. Cook did a magnificent pioneer work in this line, not only in Michigan, but his example and writings stimulated thoughtful men everywhere.

Legislation against the introduction of insect pests or plant diseases has received a new impetus since the advent here in the east of that most pernicious of all scales, the San Jose scale. Maryland has recently enacted a law which must, if enforced to the letter, almost entirely prohibit the entrance of nursery stock from outside into the state.

The appearance of this dreaded San Jose scale among us may, in the end, prove a blessing. It has already put every energetic fruitgrower in closer touch with each one of his trees; and, furthermore, he scrutinizes much more closely his trees when they come from the nursery. There is no doubt that the most fruitful source for the spread of our orchard pests is by means of nursery stock. Our nurserymen are unwittingly sending out pear psyllas, bud moths, case-bearers, and many other insect pests every year. The fact that many nurserymen often buy considerable stock at wholesale of each other, to fill out their retail orders, has apparently resulted in a much wider distribution of the San Jose scale here in the east than we are yet fully aware. Many nurseries have, at one time or another, handled New Jersey or Long Island stock since the scale obtained a foothold in these nurseries. There is direct evidence that the insect has recently been unwittingly sent out from nurseries hitherto unsuspected; and a careful examination having failed to reveal any of the scales in these nurseries, we are forced to conclude that the insect probably simply passed through the nurseryman's hands on stock purchased from infested nurseries. The recent discovery of the scale in a western New York orchard (within twenty-five miles of the Cornell experiment station) on recently-set plum trees, can be satisfactorily explained in no other way. How we are to prevent this wholesale distribution of injurious insects, is a very important and serious question, and one which yet awaits a satisfactory answer.

The economic entomologist is one of the products of a demand for more information about our injurious insects. Horticulturists and others soon found that, in order to fight their insect foes to the best advantage, it was necessary to know as much as possible about their habits and life history. I usually find that those who control their insect enemies the most successfully are the ones that know the most about them. We have much to learn regarding the habits of many of our most common insects. For instance, we do not know how long the "June bug" lives as a white grub, nor the chick-beetle as a wireworm. It is not known where or when the mother click-beetle lays her eggs that are to hatch into the young wireworm, and no one has yet reared a "June-bug" or click-beetle through from the egg to the adult insect. When we know more about the habits of those insects that spend most of their life beneath the surface, we can undoubtedly combat them much more successfully than we are doing at present. There is a wide field open here for experiment and observation.

My experience in studying the habits of insects during the past few years also leads me to believe that there is much to be learned about some of those insects that we have thought we knew all about. Some observations I have made during the past season on that apparently best known of all fruit pests, the apple worm or codlin moth (*Carpocapsa pomonella*), will serve to illustrate this last statement. That we can kill the caterpillars of this insect with the Paris green spray, applied as

usually recommended, just after the blossoms fall, has been fully demonstrated over and over again by almost every experiment station in the country and by many of our leading horticulturists. But it will be found that the explanations as to just how the poison kills the worm are obscure, indefinite, and vary considerably. The reason for this seems to be that no one has apparently made any careful and definite observations on the eggs and newly-hatched caterpillars. The usually accepted statement, as taken from our leading text-book on entomology, is: "The moth lays its eggs singly in the maturing blossom of the apple just as the petals fall. So soon as the caterpillar hatches it burrows into the apple." Almost everyone who writes about the insect glibly tells when and where the egg is laid, but so far as my search through the literature has yet extended, I have found only one instance where the writer had evidently ever seen the egg. This statement seems all the more remarkable when we realize that the literature of the pest dates back to as early as 1728, and is probably as voluminous as that of any other injurious insect. The only definite account of the egg-laying habits of the codlin moth, based upon actual observations, I have been able to find, were published in 1893 in Bulletin No. 25, issued from the Oregon experiment station. I believe this bulletin contains the first and only picture of the egg yet published. The author, Mr. Washburn, found that the eggs were laid anywhere it happened, on the skin of the fruit, and consequently later than was supposed; these important observations seem to have been overlooked by later writers. Unfortunately the operations of the young caterpillar after it emerges from the egg were not observed by Mr. Washburn, thus leaving it still uncertain just how it gets its deadly dose of Paris green.

My observations and experiments indicate that most of the eggs are not laid until about a week after the blossoms have fallen, when the apples are about the size of hickory nuts. At this time the calyx lobes on the young apples are drawn tightly together, so that it would be difficult for the moth to insert her egg in the calyx cup; in fact, the hoof-like ovipositor of the female is only adapted to laying her eggs on the surface of the fruit. The nearly round, very thin, scale-like, semi-transparent eggs, not quite so large as the head of a common pin, are glued to the skin of the apple, with apparently but little choice as to its location on the fruit. As it takes about a week for the eggs to hatch, it is thus from ten days to two weeks after the blossoms fall before the caterpillars begin operations. If the usual recommendations for spraying have been followed, the first application of Paris green is made a week before the eggs are laid, and the second application several days before the worms begin work. With these facts before us, we were at a loss to explain just how the poison could kill the worm. However, a study of the developing fruits of many different varieties of apple disclosed the following facts: When the petals of the blossoms fall, the calyx lobes which remain are broadly spread out, saucer-like, and many minute particles of Paris green could be, and in fact are, readily caught in the calyx cup. But, as about two weeks must intervene before the little caterpillar begins eating, much of this poison would ordinarily be washed out by the rains, and the first spraying thus be useless. However, nature prevents this by simply causing the calyx lobes to be drawn tightly together at their tips, as the apple grows, so that usually within a week after the blossoms fall the

calyx cup has its deadly dose of Paris green well protected by a cover formed by the converged calyx lobes. Now, how is this poisonous dose to form part of the menu at the first meal of the little caterpillar which is to begin work a week or more later? I saw one of the little creatures emerge from its egg and wander about on the surface of the apple for two or three hours, doing no feeding, but simply exploring until it finally worked its little body through between two of the calyx lobes and disappeared within the calyx cup. Further field work confirmed this observation, and showed that the little worms feed around in the calyx cup a day or more before going deeper into the fruit. Apples were then picked from a tree which had been sprayed just after the petals fell, and our chemist demonstrated that there was arsenic in the covered cup of the calyx. As nine tenths of the first brood of the worms begin feeding in the manner just described, we believe that this first spraying just after the blossoms have fallen is of the utmost importance, and will result in the death of more codlin moth caterpillars than would follow from several later applications.

Another insect that has been receiving considerable attention at the insectary of the Cornell experiment station is the peach borer. For more than a hundred years this insect has been recognized as a very serious obstacle to the growing of peaches in this country. Almost every one who has grown this luscious fruit is only too familiar with the tell-tale mucilaginous mass found around the base of peach trees in which the grub-like caterpillar of this pest is doing its deadly work. The life-history and habits of the insect were fairly well known to the earlier writers, and are given in any of our books on injurious insects, so that it is unnecessary to discuss these here. It is a curious fact, however, that, although dozens of things have been recommended for this pest, there is no record of any careful scientific experiment against it. Furthermore, it will be found that when some orchardist claims to have been successful in preventing the work of the borer by the application of a certain substance, he usually also mentions that the grubs are regularly dug out once per year. Why not give the credit to the "digging out" process, where it usually rightfully belongs?

In 1893, we treated about 450 peach trees, set for this special purpose, with nearly all the different washes that we could find recommended. This experiment has been scientifically conducted with the utmost care, and is still in progress, one year's work checking and furnishing ideas for the work of the following year. The list of substances that are being tested in this experiment is far too extensive to be inserted here; and it will require at least another year's work before many definite and final results are reached. I may say, however, that most of the things recommended, especially the washes containing lime or whitewash, have proved useless; some, like a mixture of Paris green and glue, have soon killed the trees, while others, like the recently much-advertised "German Caterpillar Lime" and its American imitation, "Dendrolene," are promising some good results so far as preventing the borer is concerned. But let me here introduce a word of caution regarding the two last-named substances, which have been strongly recommended for borers of all kinds. The first year we applied the German caterpillar lime to our young trees, little or no injury seemed to result. This year we are testing the two substances

side by side, and thus far dendrolene has killed a few trees and apparently injured some others, while the trees treated with the German product have yet shown but little injury. Other experimenters have recently reported the killing of young apple, cherry, and peach trees by treating them as directed with dendrolene. It would thus be well for peach-growers to wait until these substances have received the unqualified approval of several experiment stations before using them, especially on young trees.

The greatest trouble with most of the washes recommended for borers is that they do not remain on long enough as a complete coating. The proper time to apply washes for the peach borer, in the latitude of central New York, is about July 1; and they should retain their effectiveness for at least a month. We hope our extensive experiment will result in our being able to recommend some easier method of combating the peach borer than digging it out; but, even though we fail in this, we shall feel repaid for our work if we can show conclusively that many of the things so often recommended are worthless and should not be applied. At present we can only say that the "digging out" process is the surest, easiest, and most practicable method we can recommend. I find that the best time to dig out the borers is in the latter part of June, in our latitude. If it is attempted much earlier than this in the spring, or later in the fall, the borers are so small that many are missed. One thorough digging out in June, when they are about three fourths grown and easily found, will be more effective than both a spring and a fall examination together.

In this address I have attempted to bring together some of the later results attained in our warfare against the insect enemies of the horticulturist. I have tried to show that much is being done along this line, that much remains to be done, and that the horticulturist and economic entomologist must necessarily work together, one contributing the indispensable scientific knowledge to be supplemented by the practical ideas of the other. Some have doubtless come here expecting to learn something about the insects that have bothered them during the past year. Were I addressing a New York audience, I would include a discussion of the insects that have troubled us there in 1896, but it doubtless not often happens that the same insects are especially destructive in Michigan and New York the same year. I must, therefore, leave this phase of the subject, allowing it to develop itself in the form of questions from those interested.

DISCUSSION.

Responding to a question about peach-root aphid, Prof. Slingerland said: These lice work in two ways. You sometimes find them on the branches and sometimes on the leaves, this same insect, some of them having worked up and bred on the leaves. In the fall they will come down and breed on the roots, but they will also breed on the roots the year round. It is one of those insects that I have spoken about, and it is one of these underground fellows that you can not readily reach. The only recommendation that I can make, and the one that is made by those who have studied the insect (I am sorry to say that I do not know of any careful, accurate experiments against it—I do not know that any have

been published, there may have been some made) is to examine your nursery stock before setting it, and dip it into a good strong tobacco water or strong soapsuds. Now, this insect is not in your soil to start with; it comes on the trees first. If it once gets into the soil it can stay there a long time, because these insects are taken care of by the ants. The ants will carry them over winter. The ants and plant lice bear a curious relation to each other. The ants get what they secrete and feed upon it, so that the carrying over of these lice on the roots or in the field is due largely to the ants. The insect is spread about through the orchard in that way probably more than any other. They can not work themselves through the soil very much; they can a little, but I think their spreading around is due largely to the ants. Then, when they get up on the leaves, they sometimes produce a winged form which can fly, and that flying form of course can spread the insect over the orchard. The way to treat it is to treat your stock before you set it. Somebody has told me that ashes are proving very effective against it. I learn that Prof. Taft has made some experiments along that line. I am glad there is some one that is getting at them.

Q. What do you do with army worms?

Prof. Taft: We got ahead of the worms; that is, found the direction of their march, and plowed furrows across it, which we found was the most effective thing. Plow three or four furrows, perhaps, and put post-holes in the furrows; the worms get into the furrows, and in crawling along these they fall into the holes, and bushels of them were gathered in that way. Leave the perpendicular side of the furrow away from the point they are coming from, so that when they get into the furrow and try to climb up this perpendicular side they can not get up; and if you have some holes in the furrow, the first thing they will do when they find it is not very easy to get up that side, is to crawl along, and so they get into the holes.

Q. How does early spraying before the leaves appear, affect the aphides —how are they reached, are they reached at all?

Prof. Slingerland: You could not reach the insect by spraying before the leaves come out. You spray them mostly for fungous troubles and for scab. There are some insects at work, the caterpillars sometimes get out by that time, but generally the spraying for insects does not begin until after the leaves are out, especially for the codlin moth; there is no use of spraying until after the blossoms are gone.

Q. In talking about the codlin moth, would not it be a good time to kill the worm in the cocoon at this time of year?

Prof. Slingerland: You can kill a great many of them by scraping off the rough bark of the tree, and it makes a nice, cleaner tree; we think washing a tree will not do it—it may kill a few of the worms.

Q. What varieties of bird most affect the worms in these cocoons?

Prof. Slingerland: We see these detested English sparrows cleaning them out pretty well.

Q. How can you get rid of the squash-bug or stink bug?

A. The squash-bug is a "tough nut," there is no doubt about that. They come out in the spring. The only way I know is to handpick the old bugs and the eggs early in the spring. If you let them get started you can

kill the young stink-bugs with a strong kerosene emulsion, but it is better to get these old fellows in the spring; it is an easy matter to get them out. I do not know of any way to get at them with insecticides.

Q. How do you manage the climbing cut-worm?

Prof. Slingerland: They were very ably discussed in one of the Michigan bulletins. In New York state, and I think it is true in Michigan, you can keep them off from the trees by a band of cotton or wool tied or bound to the trees. You can either hand-pick them out of the earth at the base of the tree, or you can poison them there. A poisoned bran-mash of arsenic is very good. The worms will eat that in preference to anything else.

Prof. Taft: Supposing the trees are all taken out clean, how soon would you dare to plant? Give us your idea.

Prof. Slingerland: I should hesitate to plant before two years, any way, I think. I should not plant the next year, because I believe the ants have a good deal to do with the matter. We know that the ants take care of the root aphid. The louse depends entirely upon the ants to keep it over winter. You can plant other kinds of trees in the same soil—cherry or plum or anything like that, and it will not affect the roots. The question was brought up today whether they work on old trees. I think you will find the lice on old trees, but they are not destructive to them. You will find the most of them on young trees; that is where they do most of their damaging work.

Q. Is there any danger in the moving of the young trees that have the aphid on the roots, of the aphid remaining in the ground and being propagated?

Prof. Slingerland: You get rid of all the insects there happen to be on the tree when you remove it, but I think those that are left in the ground, some of them, would get upon other trees. The ants would carry them there, or they would get there some way.

Q. Give us a description of the foliage of an infested young tree?

Prof. Slingerland: I could not tell trees infested with root lice until I pulled them up.

Q. The foliage, I mean.

Prof. Slingerland: I do not believe any one can tell sure whether a tree has lice on it unless it shows the lice. There is a very curious and interesting relation between ants and plant lice, and the former do take care of the latter to a great extent. They will protect the lice from their enemies; the ants will fight them off. The ants you see climbing up your trees are going up there to get at these plant lice to get the honeydew they secrete. I do not know that we have any ants that are injurious to trees here at the north.

FRUITGROWING UP TO DATE.

BY MR. W. W. RORK OF AGNEW.

This topic is too large for one paper. We can not give the barest outlines of the subject. A general treatment will apply to each particular branch. We know fruitgrowing has become a large and rapidly increasing industry. This year's extension exceeds that of any other. Hundreds of acres and millions of trees and plants have gone into orchards and vineyards. As yet the supply, with declining prices, has not equaled the demand. The import far exceeds the export; means for profitably preserving fruit are multiplying; knowledge of plant life, its needs and enemies, is far beyond that of the past, and every year marks a longer distance still, as this meeting will show.

The experiment station is more and more a factor of greatest value; methods for shipping and selling are being perfected; large sections of country are waiting for the orchard; horticulture is deservedly attracting wider attention, the public consumes an ever-increasing quantity in ratio to the people. So we may safely say the limit of fruitgrowing is beyond.

But we have most emphatically come to changed conditions. In the memory of some, fruitgrowing was not thought of as a great commercial enterprise. A few years ago it was limited to a few spots, and expected to stay there. There was no organization of fruit interests. Now it possesses large territories, north and south, east and west.

There's Canada, across our northern line,
Has fields of promise, so says her Craig, both long and wide,
And threatens us with fruit most rare and fine
To flood us like a ceaseless ocean tide.

Connecticut with cold extreme and rock-bound hills.
Has orchards large and full, is planting more;
Her Hale, with facts that seem like story, thrills
The men along our wondrous fruit-belt shore.

And Georgia with her sunny clime and showers
Comes with her loads of luscious peach to cope
With that summer land of ever-blooming flowers,
California's famed Pacific slope.

But first of all, our Michigan we might expect,
Set as a gem amid great inland lakes
Which, like paternal arms, enfold, protect
From heat and cold, cyclone and blizzard wakes.

Again, our early clingstone peaches once brought a good price. Now they come with the finest of southern fruit and are almost worthless. But yesterday small fruit was unknown in the market; now the market is filled with it. The distinction between superior and inferior fruit is much more sharp. Common or small fruit, though good, is not wanted. The demand is for large and fine-appearing fruit. The distribution of large quantities is such as to break down the market. Heavy shipments

through commission result in a wide difference between the selling and purchasing price, as has been most discouragingly experienced the past season. Our orchards signally failed this year to satisfy any parties, not in bushels, but in appearance, quality, and dollars netted. One half the bushels grown and sold, at the best, would have brought much better results. The season was not altogether at fault. The same orchards with the same care and methods of marketing will, in any year, bring similar disappointment.

To meet this changed condition is the work to be done, the one vital interest of the business. It will not do to govern our orcharding by this unqualified, flattering, and delusive saying, "no danger of overproduction." It might do, if it meant better work, methods, and qualities equaling the demand. The time has come when there is little but discouragement, disgust, and disappointment for the average grower. He must move on; and notwithstanding there is much in fruitgrowing that is desirable, with good profit, it is not for the man who has no adaptation, no love of vegetable life, no eyes on the alert, no wisdom in the market, no discernment of the time for doing, a disposition to improve the future rather than the present, who undertakes solely for the money, whose integrity allows him to put up

Packages good at the bottom and top,
Stuffed in the middle with worms or rot,
However far in the mart they stray
Will surer than fate come home to stay.

And just as certainly,

Nursery stock with lying labels
Ever overturns the tables:
Brings lots of meanest trouble,
Final bursting like a bubble.

Without further defining the new environment, we conclude that to succeed now means, in a large sense, to begin over by shaping the means to the end. The orchard can not succeed on a poor foundation. Upon its bed depends its staying and paying qualities. It must be thoroughly prepared, enriched, pulverized, firmed. Who has witnessed a preparation for the orchard equal to that which a good farmer provides for his grain?

For fertilizers, draw heavily on clover and the grasses, and do not under-value the barnyard. Give the orchard absolute control of the ground, feed it as the years go on, care for it as a thing of life; to avoid splitting down, prune to a central stock with branches alternating until tree is formed; allow no large, thick, spreading tops to consume by foliage the strength of the tree and endanger it to storms; and to prevent overbearing, in times of heavy fruiting, thin with a repeater. Beautiful orchards have been nearly ruined by overbearing, fences have been made into props, trees spoiled, and the folly of owners published. Listen to the protest from every quarter against small, lean, unsightly fruit from lack of thinning. If our orchards had California's care from start to finish, the growers of that state would not come thousands of miles, and over ranges of mountains, and out-sell us in our own markets. Study our locality in relation to the market centers. Many are feeling the disadvantage of long distance and poor shipping facilities. Consider the time

varieties ripen with us compared with other localities. Fifty miles south, freestone peaches will come with our early clings, and so on to the end of our list. Find when the bulk of the crop from other sections is out of the market, and choose varieties that will supply the place. Strike from your catalogue most of the sorts. Whatever you do on the soil, mixed farming is best, save the exceptions.

Visit the best growers, study their work, read, keep a small experiment station of your own, take no man's advice who is not successful, see what you yourself can do, grade and pack up to date, forge right ahead, and you are ready to face the most difficult problem of fruitgrowing, how to sell and how to distribute. As yet we are mostly in the realm of ideals, the best of which is, let the buyer come to the grower; both can see, bargain, and handle. If the commission fraud should "get left," some of us would not. To sell through association is better than to sell single-handed. Grand Rapids societies are in evidence. This method has its difficulties, especially near the shore; like ducks with their ducklings, men readily take to the water; if thousands of miles of "the Rockies" were between us and the dock, associated effort would be a necessity.

But, shipping arrangements made, whence shall we ship? Report says prices are declining westward; to the east, then, ours goes, but only to find all others there. Naturally there is a vacuum at the other extreme, and the rush is to that. So we vibrate between glutted markets. When peaches were selling in Chicago for ten cents per basket, they were bringing, in parts of Minnesota and Dakota, twenty-five cents per dozen. If associated methods succeed, it must be through a central bureau.

All in all, we have this hope and consolation: our best men are at the problem. A brighter tomorrow will dawn. Fabulous prices may never return, but a profit will come, appreciating, in comparison with general farming, with added delight and exaltation. The Creator still walks in the Eden of fruits, and communes with the faithful and obedient. There will be toil, but amid blossoms and fragrance. The dearest of memories will cluster round the old apple tree, the home fireside, and the altar of associated fellowship; and, best of all, something will be contributed to the beauty of home and landscape, to the happiness, prosperity, and uplifting of our world-wide humanity.

DISCUSSION.

The President: I wish to say one thing about Mr. Rork's paper. It seems to me that this paper itself is up to date, and shows a great deal of appreciation of the needs of the fruitgrower; it shows that Mr. Rork has made a careful study of the question.

Mr. Wilde: That paper needs no criticism. It is a grand success; it is well done, I will say, for Mr. Rork.

Mr. Rouse: He says, take no man's advice who is not successful. How shall we judge whether he is successful? Advice has been given here by men who have not been long in the business, and they have not succeeded very largely; but those things they say seem good, although they have not experienced very much nor been proved by a long line of success.

Mr. Rork: I will stick to my text. I have been fooled by too many that had good theories and good advice, and when I undertook to follow

them I came out wrong. If I do not know whether a man is successful or not, I am slow to follow his advice. I inquire first to know whether he succeeded in taking his own medicine, and whether it helped him—if he has not, if it did not, I will not touch it.

The President: I want to say that I think, for a number of years, I was in need of an answer to the same question just put. I was taking too much advice and depending, perhaps, too little upon myself, and taking advice without knowing how to take it; as a consequence, I did a great deal of hard work and received practically nothing for it. I think, through the solicitation of Brother Reid, here (who you may think is not a very good friend of mine, from some of the things that he and I say—but he is, and I am one of his best friends), I think through his solicitations I became a member of the State Horticultural society. I think he drove up to my place one day and requested that I take an interest in this thing, and I did so; and I got my first inspiration pretty nearly from the first meeting, although we had held local society meetings in order to inform ourselves better for a year or two. But it gave me an inspiration, and I heard men make statements in regard to their practices, and I really thought I ought to know whether that was all so or not, and I spent a great deal of time and considerable money in traveling around and visiting men's plantations who were said to be successful. I afterward attended the meetings of other state societies. At state society meetings we have a right to expect the best there is in the state to assemble, and nothing but the best should be good enough for any man any more. I have attended these society meetings, I have listened to the advice, I have got just as close to these men as I could, and by spending a little time and perhaps a little money you can get the best there is. It has helped me wonderfully. Whatever measure of success I have made I do not ascribe entirely to myself. I try to see what I am looking at, and lots of times I have wondered that I have not seen more when I was looking straight at it. A single idea brought out at a meeting is often worth dollars to a man who is growing fruit; perhaps a single sentence in a paper from some man from whom perhaps you would not expect it, oftentimes a man who is a practical man, sits still in a meeting until he seems impelled to rise and say something, because he thinks there is a mistake being made; he may get up, with an effort that almost makes him sweat, and say half a dozen words that carry dollars right to some other man. I have seen that done so frequently that I have made application of those things in my own case, and have heard just single sentences that made me wonder that I had not thought of it before, because I had been all around it, that have helped me in various details. We must use judgment and then hunt for information.

Prof. Tracy: Reference has been made to successful men. Who is the successful fruitgrower? I know of a man who has resided in the city of Detroit, who was a millionaire, but many of the last years of his life had to be spent in an asylum where he was guarded and protected from self-destruction. That man told friends, although he was a liberal man in one way, giving to benevolent institutions, that it cut like a knife for him to give anything away, and yet he felt impelled to by his moral character. As I say, that man was a millionaire. He was the laughing-stock of his city because of his close pecuniary ways, and he died in an asylum where

he had to be protected from himself. That man had a brother who lived in the same state; he was far from a millionaire; he had a family, a beautiful home, and he was a man to whom every man in the community came when in trouble, a man whom all in the community felt they could rely upon, could trust, and could get help from; he was loved by all who knew him; he was not rich; but he was comfortable, lived comfortably and happily. A certain person, in speaking with the millionaire brother, asked how his brother was doing. "Oh, he has made a perfect failure of life; he had just as good a chance as I had, and I don't believe he is worth \$20,000." Now, which of these two men—one life happy in a family, the delight and help and comfort of all his neighbors; the other, unloved and dying in an asylum—which of those men is the successful one? I think the paper is perfectly right. We should go to successful men, but we should be a little careful whom we call successful men. (Applause.)

CULTURAL REQUISITES FOR GARDEN VEGETABLES.

BY PROF. W. W. TRACY OF DETROIT.

If I were to bring in here a collection of vegetables of any kind, or if I were to gather a collection of men who were successful, one with celery, one with turnips, one with cabbages, four out of five of the people who came to see their exhibits would try to get off to one side and ask those successful men, "What is it that you do to raise such celery, what is it you do to raise such cabbages?" They all have the belief that that man has some secret by which he is able to accomplish the results which they see. He does have something, but that something is a deep sort of regard, the same sort of study for the plant which our friend from Connecticut has given to the peach, the same sort of regard and study and love for the plant that our president has put into his work, and without which one can not succeed. That is the great requisite for success with most of our garden vegetables.

Now, the suggestion has been thrown out here, and the question has been asked, whether plants have nerves; and some one went further and suggested that possibly they have souls. Now, that thing I don't know; I can not answer as to that, but this I do know, that no man can succeed in raising good roses who does not love them, no man can succeed in growing good fuchsias who does not love them, no man can succeed in growing good vegetables who does not love them and is not willing to study, and it is just that point I want to raise. In order that you may understand just what kind of study I would bring out, I want to refer to a few of our garden vegetables.

Now, here are our beans, and I want to interject right here that no two plants need the same treatment, no two plants can be treated the same way and succeed equally well. Tallow and lard are not so very different. They are both fats deposited by different animals. The two animals are not very different in some characteristics. But I was down in Kansas, the other day, and I saw in every town I passed through, in the great

feeding yards, great herds of hogs following the cattle, and they are fattened and gotten ready for market chiefly on the food they gather from the excrement of these fattening cattle. I know perfectly well that there are not a half-dozen people here but know enough about sheep to know that they would not succeed under that treatment, and yet that is the best treatment with hogs; they can do better with it than any other. In the same way, certain things that would be successful for sheep will not do for hogs. For instance, sheep will do well without water, while your hog would fail to fatten without water. They are different; one requires one thing and the other requires the other. A good shepherd is rarely a good swineherd, a good swineherd rarely a good shepherd. Each kind of animal must be studied if a man would succeed in feeding it; that is a principle well-known by any one who has ever attempted to feed those animals. The same thing is true in your barn. Certain men will succeed in taking care of your stock, and will get a good deal more milk from your cows, and keep your horses in better condition than certain other men. Sometimes one man will succeed with a horse and fail with the cows, and sometimes one man will fail with the horse and succeed with the cows. It is a matter of study and understanding of that particular thing.

Now, it has not been thought so, but it is just as true of plants. No man can succeed with even our garden plants unless he can put his brains into the work, brains which will be forced by love to study the plants and know their characteristics until he knows what they like and unlike. Take our bean plant in comparison with cabbage, just as I have compared sheep and hogs—I compare them the same way. First let us commence at the root. What is the root habit of the bean plant? You will find, if you plant a bean as I have, on sandy soil, that by the time the plant is grown up and formed two leaves as big as that (indicating), even as small as that, not more than three inches across from the outside, by a careful digging we can find that the roots of the bean plants have met in rows which are twenty-eight inches apart; in other words, a bean plant with leaves no bigger than my fingers has thrown roots over fourteen inches long. The roots of the bean plant run out long, continually searching for food.

Now, take another point. Break off one of those roots. Does it heal immediately and throw out some new branch roots? Not at all. Very frequently, particularly along late in the season, after the plant has got some development, a broken bean root does not branch; it stays right where it is and does not throw out any new branches to take the place of the one broken off, and it suffers more, perhaps, than any other plant that I know of, from just simply the breaking of one of those long roots.

Take another point. A bean root, when it comes to an obstruction, which it can not penetrate, like a hard piece of soil or a stone, or which it can not follow around easily in the soil, it just stops, discouraged, and does not grow any more, and that is the end of that particular root, and you can not coax it through. With some roots it is different. Put a rotten board down in a piece of quick grass sod, and you will find the roots will grow right through it. A bean root will do nothing of the kind. The minute it finds the obstruction it stops right there, and that root does not grow any further. The bean is able to collect and utilize very closely and

very fully, through these long roots, a diluted and well matured food. It is particular about the kind of food it takes into the organization of the plant. It is very sensitive about that. It is not willing to take food that most plants would take greedily.

Go up a little further. You know that all leaves evaporate a certain amount of moisture from the under side of the leaf, through some stomatae, as they are called, two little organs which stand in this way (indicating). When it is dry, under most plants these close up, shorten and close up so as to stop the evaporation of water. These stomatae on the under side of all plants are like that. Now, if we examine these we find that the bean plant is peculiar. These things work very slowly, they do not easily close, and furthermore these cell walls are very delicate. In consequence, if we throw, while they are wet, damp, and at all open, a little bit of soil upon a bean plant, it is sure to get a little bit of dirt into one of those stomatae, and you have a diseased condition which stops the growth of this plant. Take another instance. Owing to these stomatae, the bean plant, particularly at the time of its blossoming, is very sensitive to moisture. If you have just the right degree of moisture, it goes on and does very well. If you have a drouth just at the time the bean is spreading its pollen, that pollen will be a failure. It does not perfect itself and your beans blight.

Now, all these points are necessary. A man should love a plant, and he very soon finds out things which he must find out if he would be successful in the cultivation of that particular crop. What is the meaning of it? From what I have said of the root, we know this much, that in the bean crop more than in any other it is important to do all your cultivating, all your preparation, before you plant your seed; you must get your ground in the best possible cultivation before you put in the seeds, because when you try to cultivate a bean plant after you have planted it, every cultivation is bound of necessity to cut a great many of those roots and thus do injury to your plant. Consequently, in order that those roots may find their way easily, you must have your soil fine, so that your roots will run easily. That is the point of success in bean culture, the thorough preparation of the soil just before you put your beans into the ground, through manurial agents, improving your ground with the kind of food that a bean plant can use; and lastly, avoiding any cultivation which will lead to the cutting and mutilating of the roots. I have seen a crop where a man by simply changing his cultivator one notch and giving it into the hands of another man seriously injured a crop of beans. In the forenoon the cultivator ran on the rear teeth instead of on the front teeth. At noon the handles were lifted up a little and the man thought it was not doing quite good enough work and so lowered the draft-bar one notch and bore down on the handles instead of lifting up, with the result that the rear teeth got in close to the plants, and the yield was nearly three bushels per acre less on the part cultivated in the afternoon. That was the cost of changing the cultivator, or lack of understanding of the nature of the plant. It is a simple thing, and three bushels of beans are not very much this year; but that year, when beans were worth \$1.50 per bushel, it was quite an important item. A man who loves his plant would never do that, he would love and know the plants too well to do it.

Now, turn and see how different it is with cabbages. I have spoken of the root of the bean plant. Cabbages root in an entirely different way. Instead of forming one root, the cabbage plants form innumerable roots right along the center stem. They form a great bunch of roots, and you cut one off today and in fifteen minutes there will be a formation of a callus on the end of the root, and in an hour a new root will be started from the end that was cut off. I have seen that, and demonstrated by my own observation that, under the most favorable circumstances, in an hour from the time a cabbage root is cut a new branch has started out from it. It rather helps it to be cut off, because it forces it to establish a great many of these branch roots, and they grow in that way. In regard to the stomatae, as I call them, these breathing pores that close when it is dry, they are very easily worked, in the case of cabbages, and you can mutilate, you can pound, you can pour water upon the cabbages without any danger, as in the case of the beans; and I might go through a long list of differences of that kind which exist between these two plants and also about the food. I have spoken about the food that beans need, a certain character of food. They are like sheep, and our cabbage is like a hog in the manner and the kind of food it will take up. No one would think of letting sheep follow cattle in order to get food from the waste, but hogs are fed in that way with profit. In the same way, no one who knows anything would think of putting coarse, rough, crude manure upon a bean plant to improve it. You can not do anything better with the cabbage plant. The two plants are as different almost as it is possible to make two plants, in their likes and dislikes, and until a man comes to understand those and love them and care for them just as you understand the children in your family, one of whom you can treat one way and one of whom you must treat another way, until you get at that you can not be successful in their cultivation.

Go a little further in another respect. I am only pointing out some of the different points in regard to the cultivation. I have compared my beans and cabbages. Now, here are two plants, radishes and celery. I plant the seed of some of the early forcing kinds, and in thirty days we can pull radishes and put them upon the market. A radish in thirty days will increase in weight from the seed something like one thousand times; that is, the radish will, according to variety and conditions, increase from the seed—I put in the seed, and thirty days from that the product of that seed will be from 500 to 1000 times heavier than the seed was, taking root and all together. I plant a celery seed, and in thirty days the plant will only be from 10 to 100 times the weight of the seed. See how much difference there is in the way those two plants start out in life. One has completed its growth, practically, in the first thirty days, and is ready for the harvest; the other has but just barely commenced its existence. Now, then, follow them along a little further. As you go on, your celery plant every day increases in momentum of growth; that is, it commences slowly but crowds forward with ever increasing rapidity until at last we force it, we blanch it, as we call it, through the means of this tremendous rapidity of growth, which we have established in the plant, and it is only by that rapidity of growth that we can secure the nice, blanched, crisp celery which we do. On the other hand, blanch a radish and it never

grows as fast as it does the first week. It grows with wonderful rapidity in the first week and the first ten days after it gets above the ground; it grows with wonderful rapidity up to about the time we eat it. Then, gradually, there is a loss in the rate of growth. It gradually, slowly lapses until at the time of ripening seed there is no plant in cultivation which moves forward so slowly as a radish plant in maturing its seed. This fall, on our seed farm, we actually had radish plants that were forty-five days from the time the seed was formed in the pods until the time we cut them, and then the seed was hardly ripe. I don't know of any plant which matures so slowly when it comes to final maturity. In celery it is just the opposite. It comes forward with marvelous rapidity at the last, and yet just perceptibly moves at first.

Now, isn't it necessary, if we are going to grow these, to understand these characteristics? Can you understand them without caring for them and loving them and being in some respect in touch with them? I think not, my friends, and I think that that is the only secret of success, or the great secret of success. The secret of these gentlemen who have talked is that they care for the plants they have in charge, and they love them; and in loving them are quick to give them what they want, and thus they succeed. It is true love, after all, which is the great mainspring of all success, and it is through the joy of love that success comes.

DISCUSSION.

Mr. Riehl: I would like to ask Prof. Tracy two questions. What is the best variety of Lima bean for private cultivation—for quality and productiveness? Secondly, what is the best fertilizer to produce the crop?

Prof. Tracy: Suppose I should ask Mr. Morrill, here, who has had some experience, what is the best peach? I think he would find it difficult to answer, and so I find it just as difficult to answer without taking a great deal of time, as to which is the best of the varieties of Lima bean. In the vicinity of New York they demand a thick, round bean, like Dreer's Improved Lima. In the west, in Chicago, they want the large, flat ones, the larger and the flatter the better, and you must grow your beans for your market. For my own personal choice I would rather have the large, flat beans, and I like any of the improved large strings, or improved large Limas, better than the others. It is a little difficult to answer the second question. You certainly should not use on any bean plant a rank, crude fertilizer. The best fertilizer is one put on for the previous crop; that is, making the ground as fertile as possible for previous crops, then put on your special fertilizer. The things we use are potash and bone, more than anything else. We put both of these on for beans.

Mr. Cook: Then wood ashes would be all right?

Prof. Tracy: Yes, sir, it would be of value, but not specially valuable with us. The best things we have found are those of which I have spoken.

Mr. Smith: I would like to ask Prof. Tracy if the bean taxes the soil severely?

Prof. Tracy: Yes and no. Beans are one of the nitrogen collectors, and at the same time they use a good deal of nitrogen. You can not suc-

ceed, particularly with the better class of beans, unless you have a pretty strong, rich soil. The old notion that anything is good enough to grow beans is entirely erroneous. In order to successfully grow beans you must have a soil that is rich in all the different kinds of plant food. We use much potash on our bean crop, never ashes, but always endeavor to put out fall fertilizer upon a previous crop. Our favorite idea is to put on an early crop of squashes, for instance. We put them upon clover and put the fertilizer on the clover in the fall, and plow that under early in June and plant our beans on that.

Mr. Perkins: I would like to ask the gentleman what kind of tool he considers best for the cultivation of the bean crop?

Prof. Tracy: The best tool is cultivation of the beans before planting them. If you put your ground in the best possible condition it can be made by thorough preparation, you will need but very little cultivation of the bean crop, and that should be by some arrangement by which you do very little stirring of the soil, stirring only the surface. A great many beans are ruined by cultivating too deeply. Get your ground in as perfect condition as possible before planting your beans, and then go once or twice over with some light form of cultivator which will just stir the surface. We use what we call a harrow-tooth cultivator that we make ourselves, a tooth-cultivator with a number of small, fine teeth which we run over the surface. We don't stir the roots of our bean crop at all.

Mr. Thayer: I should like to ask the Professor if deep plowing or deep preparation of the soil is necessary for all garden crops, and when it should be done; whether fall plowing or spring, or both?

Prof. Tracy: That depends altogether on what kind of piece of ground you have. If I had to answer yes or no, I would say deep cultivation is most desirable, the deeper the better, and particularly in the lighter soils where you don't run into anything objectionable underneath. If I have new ground, haven't any old farm land, I like to plow it deeply in the fall, plow in subsoil in the fall, but that is likely to expose too much of it to the winter, and in that case we occasionally cover it with some green forage crop just as soon as we have taken off our vegetable crop, and then in the spring work it just as deeply as possible.

Mr. Thayer: There is another question that your answer embraces. Having land well supplied with nitrogen, rich in potash, and deficient in humus, how can I best and quickest supply the missing humus to the soil for gardening?

Prof. Tracy: Well, undoubtedly, in a general way, the best way is to plow under, the most economical way. I am speaking not of a garden place in a city, but outside of the city where you have plenty of land. The best way is to plow under green crops of some kind, but we on our farms do not let a piece of ground remain bare after we have taken a crop. We think we ought to go out and apologize to it if we let it remain a week. We immediately put on something; rye, or, as the circumstances may be, some green crop which we keep going, and put manure upon that and plow it under whenever we have a chance.

Mr. Thayer: What green crop may I put on there to the best advantage, in your judgment?

Prof. Tracy: I can not answer that. We have used rye. We use rye sometimes, and we use corn; under different circumstances we use differ-

ent plants. I know of a friend who is growing squashes, who makes a great success of it. The last thing he does when he gets through with his Hubbard squashes, cultivating them the last time, is to go over it and sow medium clover right in with the squashes. The squash vines of course are killed by the first frost, and it is astonishing to me to see what a growth of clover he gets on that piece of ground. In the fall or early in the spring he puts on a liberal supply of manure, and he does not plow it under until he wants to plant his squashes, and it does seem as though that ground was improving very rapidly. He had his fifth crop of squashes last summer, and it is the most successful one he has raised.

Mr. Thayer: I have been using rye in northern Wisconsin because it stands the frost. I have also tried buckwheat, but the frost has taken that, and I have adopted rye recently, and I wish to ascertain if there is anything better, especially for a northern climate where we expect frost early in September?

Prof. Tracy: On our farm we have used rye a good deal. The man who runs our farm and has charge of it directly is very strongly of the notion that in some way—I can not connect it very directly, but perhaps Prof. Taft could give us light on that subject—the use of rye encourages rust, the development of rust in case of beans being the following crop. You know rye is a plant much given to rust. His opinion is that the sowing of rye tends to increase that rather than otherwise. One point I wish to speak of in connection with sowing rye is that rye is a bad plant if you let it get too large before plowing under. In the fall, if you are not watching it, it is up too high, and when you plow it under you have an air-chamber under your sod, of which it is hard to get rid; and if there comes on a drouth it is likely to injure your crop. I would like to ask Prof. Taft as to rye furnishing a nursing plant for the rust which will afterward affect beans and other plants?

Prof. Taft: I would say that I think there is no connection between them directly, the rye and beans and similar crops being so unlike, but from the different grain crops of course the same rust could go from one to the other; but there may be an indirect connection—it would be merely a guess on my part. I never had occasion, so far as I recall, to follow rye with beans, but it is possible that the decaying of this rye turned under will start a sort of soft growth of the bean, give it a quick start, and we know that when we have that condition, when the leaves are soft and tender, that they are more subject to take on these diseases. This rust is a fungous disease, and that may be the cause. I do not know anything about it, but I am very sure there can be no connection directly between them.

The Secretary: Will you answer the question Mr. Tracy declined to answer, in regard to the cover crops?

Prof. Taft: We have been talking that over, and I agree with what Mr. Tracy said now.

Mr. Slayton: Prof. Taft, is rust on rye and beans and all other plants really a fungous growth? Does it develop from spores, or is it a condition that is produced by certain conditions of the atmosphere, and is it like rust on a piece of iron—is it organic?

Prof. Taft: Of course, indirectly the conditions of the air may influence it, as we know certain conditions of weather are likely to bring

on rust, but rust itself is just as much a growth from the spore as the bean plant is from the bean.

Mr. Slayton: Then we are to consider that there are spores of rust always with us?

Prof. Taft: Likely to be; yes, sir.

Mr. Slayton: And develop when the weather is just right?

Prof. Taft: Not only that, but every plant has a distinct rust of its own. I don't know how many thousands of fungi there are around, but there are a half-dozen kinds.

A Member: I had two pieces of ground well prepared during the month of May, and planted sweet corn, beans, cucumbers, tomatoes, and potatoes, and I had a full crop of everything except potatoes, which were not worth the digging; and I would like to know what was the trouble. I planted them in the same kind of ground and planted them all at the same time, and it was a new experience to me. You have talked a good deal about loving what you grow. I always take an interest in my garden, and this was a new experience to me and I could not account for it, and so I asked the question. I would like to know why it was I did not have any potato crop when I had a full crop of everything else I planted.

Prof. Tracy: I can not give any explanation without knowing more about the circumstances and conditions under which the things were grown than I do now. I can not even suggest, now, a reason for it—it would be clearly guessing.

Mr. Harrison: I would suggest a lack of potash. We planted two pieces of potatoes on a mucky piece of soil, and on a portion of it we put an application of muriate of potash. Where we sowed the potash we had over 200 bushels of potatoes to the acre, and where we did not use potash we had about 100 bushels per acre, and the potatoes were not as good. The potato is a great potash consumer, and it might be your failure was from a lack of that material.

Mr. Williams: To go back to this cover crop, I would like to know if rye furnishes nitrogen to the soil when plowed under as a green crop. The reason I ask this question is, I was quite interested when our friend from Canada was reading a paper, and the idea seemed to prevail, if I understood it right, that we must have clover or peas or something of that class of green crop, the roots of which have a peculiar way of developing bacteria. I can not give you the scientific terms, but something on the roots that produces this nitrogen, and that rye does not do it. Now, when our friend from Wisconsin asks about rye, the impression here seems to be that it does produce nitrogen, and yet it does not have that peculiar kind of root. I would like to know whether rye does add nitrogen to the soil, and if I understood the talk yesterday right.

Prof. Tracy: I do not think that it adds nearly so much nitrogen as some other plants. The fact of it is, I used to be a very warm advocate of rye, and used it very largely and thought very highly of it. Of late years I have thought less and less of it, and I have had larger experience in using other plants. I am using clover more largely than I ever did before. We sow clover, and if we get any crop that is off early in August or the early part of August, we put on clover seed and we put on a great deal. We do not expect that to go through the winter. If I could only get a place where I could grow Crimson clover the way they do down in

Philadelphia, I could flood the whole country with crops, but we can not get it; still, we put it on after the fall crops and get all we can of it. I do not think rye is of very much value as a manurial crop, but it holds some of the properties that would otherwise escape.

Mr. Perkins: I would like to ask Prof. Tracy what experience he has had with cow peas.

Prof. Tracy: On the farm in Detroit I have had some experience with peas, but never with any success. The only success I ever had with them was on a farm in Grand Traverse county, which would seem to be too far north to succeed with them, but I succeeded quite well with them there; we have not succeeded in Detroit and in southern Michigan. We will never use them there at all; we have abandoned using them altogether.

Mr. Harrison: I can not say that we have had much experience with cow peas, but we put in twenty-five acres this year and we got an excellent growth, very large indeed, so much so that we had to put on a revolving cutter to cut the vines to get them under. Our land appears as though it would be in excellent condition for spring planting. Of course, if we take the reports from the experiment station, we have gathered a vast amount of nitrogen from the atmosphere that rye does not gather, rye not being a nitrogenous plant. We sowed them in the latter part of May, as early as we could get the ground plowed, and we turned them under just about the time they were commencing to ripen. We turned them under in the latter part of September.

A Member: The ground was surrendered to them for one year, for the purpose of building it up?

Mr. Harrison: Entirely so.

Mr. Hale: In considering the value of cow peas as a crop for green manure, I believe it is the most valuable summer plant that we have, and quite far north, but it must be considered that it is semi-tropical in its nature, and a tender plant, and will thrive just about with Indian corn. You can plant it about the same time that it is safe to plant Indian corn, and it will be killed by about the same kind of frost that will injure the corn, so it must be grown during the mid-summer months. If you have abundant acreage and can spare your land for a year with cow peas, you can probably grow more forage and more substance for green manuring, filling your ground with a great deal of organic matter, and at the same time gather more nitrogen, than you can gather in any other way in the same season; but whether you should grow cow peas or clover depends upon whether you can spare the land. With us in Connecticut, with much the same climatic conditions as Michigan, and south, the minute the picking of strawberries is done we turn the ground over and sow the entire acreage with cow peas and get an enormous growth, three or three and a half feet in height, and just a mass of leaves. We get this growth to plow under, as Mr. Harrison says, in the fall, and we sometimes roll it down with a cutaway harrow and sow rye to hold the nitrogen that has already been gathered.

Mr. Richl: Speaking of the cow pea, I want to add that with us we find the cow pea a very valuable plant, and it is coming into use more and more. My own experience the past year has demonstrated one thing that surprises me. I had an orchard that I could not well cultivate, a peach orchard. I sowed it about the first of June with cow peas and allowed

them to be there all summer, instead of cultivation, and I found those trees did better than any trees I ever had on the land with cultivation. You know, of course, that the cow pea forms nitrogen in the soil from the roots, and the evidence in southern Illinois is that if you grow a crop of cow peas and remove them the land is richer when that crop is removed than it was before. It is one of the most valuable crops that we can grow, especially for supplying humus. It will make more valuable matter to turn under than any other plant we know. On that point I wish to say that I think one thing is lost sight of in the growing of grain crops. It is rather misleading when you say plowing under green crops. I believe, and I think I am right, that the riper your vegetable matter is the more woody fiber it contains, the more humus will you get from that product after it decays. In the matter of rye, of course that is a different thing. Put it on in the fall and it simply holds the nitrogen that is there, that would go to waste, and keeps it for the next spring; but if you want to add more humus, let the crops become as ripe as they possibly can.

Mr. Williams: There are two objects we should keep clearly in view with this question of manuring. I am principally interested as a peach-grower. A great many of us are interested in that way; our peaches are on sandy land, and we want a green crop, first to act as a cover crop, to protect the sandy land from blowing through the later summer months and from freezing when exposed without snow. Again, we wish to produce this nitrogen to add to the soil. Rye, I conclude from the discussion here today and yesterday, does not give us much of the nitrogen, but it seems to be the best crop for the cover because it lives through the winter. What I would like to ask is, the season required to mature cow peas; that is, in time to accomplish both purposes. Could I sow those peas at a proper time so that they would be killed by frost and yet those killed vines, lying there, would cover the ground and act as a cover crop, and get the advantages from cow peas as nitrogen producers? If that can be done, then how early must I sow them? If I sowed them, how early would they mature or seed, and thus perhaps bring a drain on the land that I would not care to have? What time must I sow in order that the crop will not mature and yet the vines will be there as a cover crop and as a nitrogen producer?

Mr. Hale: I thought perhaps I made it clear. It is really a crop that needs mid-summer weather to grow it in its greatest perfection, but ordinarily you do not care to give up the broad cultivation of your orchard soon enough to sow any cow peas. If you are willing, however, to substitute a one-horse cultivator or something to go between the rows in place of the broader harrows, then you may sow cow peas, never later than the 1st of July, to get sufficient growth, and then in the months of July, August, and September you get their full growth. I do sometimes sow them as late as the 10th or 12th of July, but I do not get sufficient growth; but you get a good winter cover for your orchard ground. I do not know, but the scientists tell us the amount of nitrogen you would lose, but you would lose a good deal of nitrogen through your dry matter in the winter.

The President: That was above the surface only.

Mr. Hale: Yes, sir. To avoid that, my plan, where I had cow peas in orchards, and I have done it in young orchards, is after they have been

killed by the frost and have died down a little, so that I can get on with a disc harrow, I sow on a little rye and that gathers all the nitrogenous matter and in that way make a trap to hold it.

Prof. Tracy: That is in Georgia?

Mr. Hale: That is in Connecticut.

Prof. Tracy: Did you get your rye big enough?

Mr. Hale: O yes. Why, we can sow rye here on the 1st of October, the 10th or 15th of October, and get a good growth.

The President: At the meeting of the Western New York society, last January, some of these matters were gone into very thoroughly, Mr. Hale taking part in the discussion. In regard to crimson clover, with the understanding that it was to die during the winter, Prof. Roberts made a report of some careful experiments in that line as to the value of nitrogen trapped between a point in July or August—do you recollect the time, Mr. Hale?

Mr. Hale: I think it was about the 20th of July.

The President: Somewhere along there; but at a time the fall growth had ceased, and his different experiments taken up and tested, the ordinary commercial value of nitrogen placed upon them, and he found at the rate of from \$6 to \$13 per acre left in the stock or plant as the product gained during that time. Consequently the opinion was there that it would be profitable, if it never wintered, in the gathering of nitrogen. Am I not nearly correct in these figures, Mr. Hale?

Mr. Hale: I am not sure about the figures, but he was emphatic that even though crimson clover did not live through the winter it paid well for its sowing, and I am sure crimson clover will pay even if you are sure it will kill out.

The President: I am quite sure those are the figures Prof. Roberts gave of the different tests, and my recollection is that the concensus of opinion, in which Mr. Hale coincided, was that if a man followed that in a peach orchard, year after year, he might get undue accumulations of nitrogen. That is, an unnecessary amount, and it might possibly be hurtful to the orchard, but not necessarily.

Mr. Hale: That was generally stated.

Mr. Perry: Speaking about sowing those cow peas to hold moisture and help the land in a peach orchard, would it be any profit to harvest, in regard to holding moisture?

Mr. Riehl: Yes, but it makes very fine stock feed. You must be careful and not let your stock eat too much of it. They like it so well, and they will eat so much, that it is not good for them. I was at a party's place who had grown a great many acres and had forty or fifty tons of cow peas feed, with the pods, that he turned his mules and horses and cattle to, and he found that they were too rich, and he had to fix the stock so as to feed them instead of letting them go to the racks. They would not eat anything else.

The President: Mr. Riehl, during the time in which these cow peas were growing in your orchard, did you suffer from drouth?

Mr. Riehl: We had a drouth, and that is just the point that surprises me, with such a heavy crop as was growing there and no cultivation, that those trees would do better than they did in open, cultivated lands.

The President: There was a general drouth?

Mr. Riehl: There was a drouth, yes, sir, and those trees did not suffer.

Mr. Hale: Answering our friend on the right (it does not seem as though Mr. Riehl had made it clear), while he has made it clear that cow peas are very rich forage indeed, yet if we are growing cow peas or any green crop in our orchard we are growing them not for the purpose of producing forage but for the benefit of our orchard. If you want them for forage, grow them in some other field. The purpose of planting these green crops in our orchards is for the improvement of their condition mechanically, and for adding plant food cheaper than we can buy fertilizer.

RELATIVE HARDINESS OF FRUIT BUDS OF PEACHES AND PLUMS.

BY PROF. JOHN CRAIG OF OTTAWA, ONTARIO.

The cause of the frequent and sometimes chronic unfruitfulness of apple and pear orchards is invariably a source of deep financial interest to the fruitgrower, besides furnishing subjects for the speculation of the theorist and for the investigation of the scientist. It is cheering to note that the efforts of patient scientists and observant fruitgrowers are being rewarded each year by the addition of some new facts to our store of knowledge upon this subject. In this connection, I am reminded of an excellent review of the field, presented to your society by Prof. Bailey some two or three years ago. The work of Prof. Waite upon pear blossoms has been duplicated by Prof. Beach upon grapes, and these observations now give us a large amount of valuable data. My object at this time is to present for your consideration some thoughts and some facts bearing upon the relative ability of the fruit buds of our cultivated peaches and plums to withstand low and rapidly fluctuating temperatures.

The fruit bud is, after all, only a modified branch—a good deal compressed, it is true, as in the case of a leaf bud, into a small space.

Beginning at the centre of a cherry, peach, or plum blossom, we find the pistil or female organ. It is composed of a dilated basal portion, the ovary—a long, tube-like prolongation, the style, with a knob-like termination called the stigma. The pistil is made by the fusion of two sessile leaves—that is, leaves without stems. Around the pistil we find a small army of stamens. These, too, are modified leaves, modified for a certain purpose. A single stamen is made up of a delicate stalk (filament) ending in a cylindrical blade (anther). The anther contains the pollen sacs, which lie on both sides of the connective line. There are usually four pollen sacs in each anther. The pollen is developed by a modification of the internal cell tissue. When the stamen has matured, these pollen grains are liberated by the splitting of the anther, which at the same time opens the pollen sacs. The power which art may exercise over plant growth is shown in the modification of a stamen into a petal, as in the doubling of flowers, and even into green leaves, which is a still more retrogressive action. Surrounding the stamens we find a series of

delicately constructed and beautifully colored envelopes. These assist in protecting the organs within, but their principal function is to attract. Outside the petals are the sepals, another set of leaves whose mission is to protect. This, in brief, is a type of flower. There are thousands of variations, but all amenable to the general conception that a flower is a modified shoot, with its parts arranged in whorls or sets and corresponding to the arrangement of the twig, and as such may be transformed from one series to the other.

Prof. Bailey, in his excellent book on plant breeding, emphasizes the distinctive difference between pollination and fertilization, terms which are often used somewhat loosely. Pollination, as defined by him, is the artificial or manual part of the work of carrying or transferring the pollen from one flower to another. Fertilization is the work of the pollen itself, and means the germination of the pollen, growth of the pollen tube down through the connective tissue of the style to the cavity of the ovary, where fecundation takes place. The stimulus which the process of fertilization imparts to the ovule, and which results in the development of seed, is also transmitted to the tissues of the ovarian wall. We recognize this in the rapid modification of the flowers of apples and pears after fertilization takes place. With the development of the seeds, the carpels surrounding these become modified from green tissue into ripened fruit.

The reasonableness of the statement that it is the temperature of the surrounding air that chiefly determines the temperature of twigs and branches, as well as the more delicate parts, such as fruit buds and leaf buds, will be at once admitted; yet many people speak vaguely about the benefits of mulching trees heavily after the ground is frozen, in order to hold the frost in the ground in the spring, and by this means retard the opening of the blossoms. One experiment of this kind, if fairly tried, will convince the most skeptical that the buds, with their store of prepared food, respond toward spring, after their accustomed winter's rest, to the temperature of the air which surrounds them, regardless of the temperature or condition of the soil. A study of the effects of frost upon plant tissue is exceedingly interesting.

In looking into the literature on this subject, I have found in "Diseases of Trees," by Prof. Hartig of Munich, Germany, many valuable facts and observations which I may be allowed to present. Considering the action of frost upon what we call dormant wood, he says: "Death of a plant under the action of frost during winter bears a close resemblance to effects of drought in tissues." Severe frost, as before stated, abstracts moisture, and in proportion to its severity. The cells may, therefore, die in winter when this deficiency of water exceeds a certain limit. Hartig further says: "A change is induced in the molecular constitution of the protoplasm, which is rendered incapable of retaining any considerable quantity of water. This change is brought about probably by the formation of new molecular groups." "Should the critical limit of drought not be passed, the cell gradually reabsorbs and life functions may proceed. If this critical point is passed, the cell can not reabsorb, and it withers. The same holds true with regard to the action of frost, as inducing a loss of water. The cell will bear a certain amount of frost, such as will not disturb the molecular arrangement of the protoplasmic particles; but,

as in the case of drought, when this limit is overstepped the cell is unable to recover the water abstracted by the process of freezing, and death ensues. This may be illustrated by the action of frost upon starch paste. Frost separates the water, but subsequent thawing leaves the water and the starch in a separated condition. Our winters are rarely so cold that our forest trees ever become injured by molecular disorganization of the protoplasm of their cells. These have become injured by long and gradual processes of acclimatization. Not so with exotics, including many varieties of ornamentals and not a few classes of fruit trees, among which we may mention peaches and plums.

The absorption of water by the roots ceases when the ground is frozen to a depth that is reached by the roots of the young plants. No harm is done if the trees are protected above ground against evaporation, by snow or other covering. The twigs and exposed branches, in cases of extreme frost, then suffer as if affected by severe drought. Warm south winds, causing evaporation during winter, then, have this injurious effect. The limits of forest growth, in my opinion, are as much determined by the action of drought as by low temperature.

When a thaw occurs in the frosted parts of a plant the tissues usually regain the condition which characterized them before the frost appeared. As the water is set free by the melting of the ice, it is slowly absorbed by the cell walls and the cell contents. In many cases, however, it is found that the parts have been killed. Instead of the chemical processes that are revived under the action of a recurrence of normal metabolism (living conditions) they imitate chemical decomposition. Views are divided as to the time when frost proves fatal. Some say during continuance of frost. Sachs is of the opinion that the tissues die only after they have thawed, and that the issue depends much upon the manner of thawing. Both theories are probably correct at different periods in the life of the plant.

First, then, the effect of frost upon green tissue. When the tissues of the leaves or cortex, and, in fact, when any parenchymatous green tissues are frosted, pure water is withdrawn into the adjoining intercellular spaces, but the cells themselves do not generally freeze. The result is that the cells lose their turgidity and at the same time begin to droop.

In the case of frost affecting growing tissues, the issue depends upon the manner of thawing. Should the plant thaw gradually, the water which has been extracted is reabsorbed by the walls and contents of the cells at the same rate as it is formed from the ice crystals by the gradual accession of heat, so that normal conditions are restored. In the case of a rapid and marked rise of temperature, the ice thaws rapidly and the ice-water flows into and remains in the intercellular spaces, driving out the air and causing, in the case of green leaves, the translucent appearance so well known. Chemical processes start afresh under the influence of the rise in temperature. Instead of these processes going forward in the ordinary manner, decomposition sets in, resulting in dried and withered foliage.

The manner of destruction of the fruit buds of peaches and plums is undoubtedly analogous to the conditions, causes, and effects outlined above. In many cases the fruit buds, being the tenderer parts in the plant's anatomy, are injured, as the peach-grower learns to his sorrow,

while the leaf buds pass through uninjured. In their composition there is undoubtedly a larger percentage of water and assimilated food material than in the leaf buds. For this reason they are oftener influenced by sudden climatic changes than the leaf bud. Approaching as they do more nearly the physical character of the green leaf, they are thus more liable to injury from sudden cold, followed by a rapid rise of temperature. It is the temperature of the surrounding air that chiefly determines the temperature of the twigs, and I may say the vegetative action of the buds. The roots may be encased in a mass of frozen soil and covered with a sheet of ice, yet, if the conditions of the atmosphere are favorable, leaves and flower buds will expand and develop, at least till the food material stored up for immediate assimilation becomes exhausted. In this respect the similarity between the action of the fruit bud and that of the seed, with its store of prepared food, may appropriately be pointed out. This leads me to say again, therefore, that in my opinion no amount of what might be called artificial precaution that might be taken in the way of heavy ground mulches would affect the time of blossoming of fruit trees to any appreciable extent and certainly not to the extent of holding them back so that injury from late frosts might be averted.

An effort, which I may say was partially successful, was made last year to ascertain the relative amount of injury sustained by peaches and plums throughout Ontario. After beginning the investigation, many collateral questions of great interest arose in connection. These perhaps in a measure clouded the main object, which was to discover, by examining the same variety from different localities, whether it was characterized by a more or less fixed ratio of hardiness wherever grown. Owing to the varying conditions, I found it exceedingly difficult to arrive at reliable data. Twigs of the same varieties, bearing fruit buds, were secured from a number of localities in Ontario. The parts of the buds were examined with a hand lens, but the majority of the scions were placed in water in a hot house, where they were allowed to expand at will. While the results may not be in accord with the experience of some growers, by reason of peculiar soil or climatic conditions, yet I believe that they represent in a general way the ability of a number of the standard varieties of peach and plum to produce fruit after winters of unusual severity, and may in this way be of service to planters.

It is a well-recognized fact that the percentage of fruit buds killed, in the case of peaches, does not represent by inverse calculation the percentage of a full crop which may be looked for. If a fruit set for every fruit bud that blossomed, much less opened, then would thinning become an annual necessity instead of, as at present, an occasional possibility, desirable oftener than practiced.

At the close of the fruit season, circular letters were sent to those who so kindly furnished the scions, asking for approximate crop returns of peaches and plums, in order to compare these with the estimates made by examining the buds. An element of error, at first not appreciated, affecting the accuracy of the results obtained from the examination of the fruit buds, lies in the fact that many of the buds received were cut, no doubt, from the lower branches of the trees. Observant fruitgrowers will have noticed that during years of light crops, when frost has been the lessening agency, the major portion of the crop is often upon the

upper branches of the trees, where the temperature, probably, at the critical period, ranged somewhat higher than the stratum of air surrounding the lower branches.

A list of peaches, made out in order of hardiness of fruit bud, based upon the results of these investigations, which I wish to place before you as preliminary, tentative, and subject to revision, rather than permanent and final, would read as follows:

Group 1.—Hill's Chili, Longhurst, Barnard, Early Rivers, *Oldmixon.

Group 2.—Salway, Smock, Tyhurst Seedling, Wager, St. John.

Group 3.—Hyne's Surprise, Hale's Early, Fitzgerald, Foster, Reeves Favorite, Crawford Late.

Group 4.—Crawford Early, Wheatland, Mountain Rose, Early Richmond, Amsden June, Red-Cheek Melocoton, Alexander, Early York, Garfield, Champion, Shaw's Rareripe, Stephen's Rareripe.

Following the same system with regard to plums, I would group them as follows:

Group 1.—English Damson, Shropshire Damson, Blue Damson, Canada Orleans.

Group 2.—Lombard, Smith's Orleans, Moore's Arctic, Reine Claude, Glass Seedling.

Group 3.—Duane's Purple, French Prune, Coe's Golden Drop, Field, Grand Duke, Fellemburg, General Hand, Pend's Seedling.

Group 4.—Quackenbos, Washington, Victoria, Yellow Egg, Jefferson, German Prune, Bradshaw, Columbia, Gueii, Prince's Yellow Egg.

Group 5.—McLaughlin, Niagara, Prince of Wales, Prince Engelbert, Shippers' Pride, Burbank, Ogon.

Group 6.—Abundance, *Prunus Simonii*, Satsuma, Willard.

Tender fruit buds are not always correlated with tender leaf buds. For example, Glass' Seedling suffers less from the winter-killing of the terminal shoots at Ottawa than most other varieties of *Prunus domestica*, yet it bears fruit only when winter visits us in its mildest form. Other varieties, which have their terminal wood killed back almost every year, produce fruit more or less regularly upon spurs situated on the older branches. The substance, then, of the results of these investigations is, that there is a striking difference in the relative ability of varieties of peach and plum to withstand the injurious effects of low temperatures coupled with rapid fluctuation. To overcome this, growers should select the hardiest varieties having commercial merit, planting them in situations furnishing climatic conditions subject to the least possible fluctuation of temperature. This is, of course, entirely in accord with the experience of Michigan as well as Ontario fruitgrowers, and as a measure of safety has often been ably advocated by your progressive pomologists, as well as by your eminent exponent of the principles of scientific fruit-growing, Prof. L. R. Taft of the Agricultural college of Michigan.

Finally, cultivate in such manner as will encourage the most thorough ripening of the wood and fruit buds possible. After this the fruit; and when we have secured the fruit, it is Grindon who says there is just one hour, not much more, when the odor and taste of these regal fruits are at their highest pitch. The meridian passed, the fruit is still delicious, but

*This variety is usually found to be tender in fruit bud.

now it is afternoon. This is true in part, but most of us can not be so exacting, and will be more inclined to agree with the same author when he says that the composition of the peach is so exquisitely subliquid that, while enjoying the fruit, we hardly know whether we are eating or drinking. It is well to incite desires which may lead us to do better by various measures of encouragement.

Mr. Hamilton: I think that Oldmixon would not be considered by our shore people as being among the hardy varieties; the other varieties named by the gentleman would be considered hardy, but Oldmixon would not be.

A Member: With us the soil is just the opposite of that of which Mr. Craig speaks. On the light sandy soil our peaches were all killed, while on heavier loam soils they were not. We had a full crop on our heavier loam soils, but on our sandy soil on the lake shore they were all killed.

Prof. Craig: I think that could be explained by the direction of the wind at the particular time of the killing frost. The effect of wind was observed along both sides of the Niagara river last year. On the Canadian side fortune favored the fruitgrower and sent the cold current the other way, resulting in the comparative destruction of the peach buds in the United States, and leaving a fair crop on the Canadian side.

THANKS TO MR. HALE.

The Secretary: We paid a deserved tribute of esteem to Prof. Craig when he was here, a mark of respect which gave us pleasure, but Prof. Slingerland has slipped away without giving us an opportunity to show a feeling of good-will toward him. Before it is forgotten, and before Mr. Hale gets through the back door, toward which he appears to be gravitating, I wish to have an opportunity to express our appreciation of his services here. I therefore move that, whether it is true or not that the Connecticut river shad is the best shad that has swum since Adam was forbidden fishing in the Garden of Eden, and whether the Connecticut peach is the best peach on earth except the peach from Georgia, whether those things are true or not, we certainly have found that the Yankee from the Connecticut river valley surpasses in all the well-known traits of character any other sort of Yankee, and that we therefore give a vote of thanks to the representative of that class of Yankee who has been with us, and wish him God-speed in all his ways.

Motion supported by Prof. Tracy and unanimously carried.

NAMING THE "LYON" PLUM.

Mr. Slayton: Before we take up the apple discussion, there is one other item I would like to consider. A few years ago a stranger appeared here, in the family of our brother, Mr. S. S. Bailey. He has been cared for and has proved so worthy that he turned him over to our father, Mr. Lyon, and with him he has proved so golden in appearance, so well worthy of favor, that we might say he was a child of the golden age come to live among us. He is without a name. He is a member of the plum family; and before this society adopts him, Mr. Lyon can tell you about

him—give you a description of him. Before this society can legally adopt him he needs christening, and I moved that a committee be appointed to name the new plum.

Mr. Lyon: Some three or four years ago I received scions of a plum without name or history, from our friend Mr. Bailey, and grafted them upon a young tree that was nearly in bearing, and it has now fruited three years at the station at South Haven. It proves to be an admirable grower, and is now showing itself to be an excellent, most productive bearer. It is of fine size, light color; if I recollect right, a clingstone, and it is of very good quality indeed. I think it is an eminently desirable variety for cultivation for commercial as well as for amateur purposes, and I feel quite at liberty, from the experience I have had with it, to commend it for general planting. It has all the qualities necessary to answer as a commercial variety, in the way of handling; it is not so delicate but it will handle well; it is of good size, not the largest by any means, but large enough, and from what I have seen in the last few years, as to its productiveness, I think it will prove itself satisfactory in that respect. There will be a notice of it in the bulletin from the agricultural department of the state, when it comes out. I would say it has heretofore appeared in these bulletins as the Bailey, the objection to that name being that there is already a Bailey plum named from our once citizen, Prof. L. H. Bailey, and of course it would hardly do to name another "Bailey."

The motion was seconded and carried, a committee was appointed, which reported in favor of naming the plum "Lyon," and the report was adopted.

TREATMENT OF BEAN WEEVILS.

Mr. Taylor: For variety, will you place your hand, Prof. Slingerland, to the left of that desk, and see if there is not a bottle there? It is a bottle of bugs and beans, and some one wanted to know what the bugs are.

Prof. Slingerland: This year the bean crop in all places where I have been is practically full of bugs. In this bottle we have several beans, and they are full of holes, and from those holes have come these little beetles. We call them bean bugs or bean weevils. The peas have a similar insect, a little larger. The only way to handle these insects is, after they get into the bean, after the beans are shelled (you can not tell they are in there; they do not develop until after the beans are shelled) to put the beans into some tight receptacle. Then get carbon bisulphide. It is a liquid which will evaporate very quickly. Its vapor is explosive and it must be handled like gunpowder. Get the beans into a tight box, then pour this liquid through on top of the beans, or in a shallow dish put on top, because the vapor is heavier than air and will sink down. This liquid is sold by the ounce by druggists. A pound of the liquid treats a hundred bushels, I think, about that rate, a hundred bushels or a ton, about a pound to a ton. This is the substance that is used in treating wheat for all sorts of wheat insects. It will destroy the insect in all stages, even inside of the bean. I do not know any way to tell that the beans have the bugs in them until the bugs begin to get out. We thought once we could put the beans into water and those that were affected

would float. Sometimes they will float and sometimes they will not; and when you buy beans to eat, the only way you can tell is by finding the holes in them. If there are no holes, you can eat them.

Mr. Taylor: The gentleman thought the eggs were laid in the blossom, and in some way they get to each bean.

Prof. Slingerland: The eggs are stuck through the pod. We used to think the eggs were laid on the outside of the pod, but I saw some of the little beetles digging holes through the pods, right along the seam of the pod, the string as we call it on the string bean; they eat a hole right through, and then stick their eggs through there. They are laid on the pods soon after the pods are formed, when the pods are green. The eggs hatch in a week or so and the little grubs work into the beans. They are so small that you could not tell with the naked eye where they went in. They are white grubs, nice, fat fellows to go with the bean when you eat it! The insect develops and is full grown about the time you get your beans shelled ready for market, and if the beans are kept in a cold place the insects will not come out until spring. If you keep the beans warm they will come out in the fall and winter. The bean weevil will continue to develop in the beans; that is, if you leave beans with the weevils in them the weevils will lay eggs on the dry seeds, stick them upon the sides, and they will continue to breed. If you keep the beans over winter in a warm place you will get half a dozen broods, they will breed right along, over and over again. Now, the pea weevil will not do that. The old remedy used to be to tie the beans or peas in a bag, tie them up tight so that the weevils could not get out, and they would die there. Now, the bean weevil will not do that. They will breed right along in the dry seed, but the pea weevil will not breed in the dry seed. If you have the bean weevils you should get rid of them, because if you do not they will breed right through the winter if the beans are kept warm enough.

QUESTIONS

Will it be of any advantage to sow oats as a mulch in strawberry beds in late summer?

Mr. Hale: It is a very good plan indeed when you have no other method of getting mulch, to sow oats in your strawberry field at the last hoeing or cultivation, some time in August or early September, and you get a good growth. It checks your growth of strawberries somewhat. It is quite satisfactory. Of course it is free from weeds and seeds or any foreign substance dying down.

The President: In connection with that I wish to make a suggestion. I never have tried that, but I do a good deal of sowing of various crops between rows that way. I sow wheat in corn sometimes because I can do better with it than I can even in a summer-fallow. For that purpose I have bought a five-spade drill that is adjustable to any width, and it is the neatest little tool in the world if you want to put anything on ground between the rows, and a man can go over just as much as a horse can go over once in a day, and you can slip over it and put in just what you see fit. It only costs fifteen dollars and is made at LaPorte, Indiana, by Rude Brothers, and it is an excellent tool for anybody who is doing any work of that class.

Can you sow clover seed with that drill?

Mr. Morrill: No, but I believe there is an attachment for that purpose.

What is the future financial outlook of apple growing?

The President: I supposed that question was pretty well gone into this forenoon. Will anybody venture to answer that question?

Mr. Riehl: You probably know something of it, that in southern Illinois, a few years ago, the people went crazy on apple-growing. They planted Ben Davis by the hundreds and thousands of acres and whole counties were covered at that time. A few weeks ago I was down there and I inquired as to the status of those orchards, and well-informed men assured me that sixty per cent. of them planted in that boom are now being neglected and would never make their planters or their owners one dollar. This year we have had apples all over this northern country. Down there we have not had many, and the result has been that prices have been low, but you may go ten years and that will never happen again. On the other hand, here is the whole northwest, west, south, and all this prosperous country wants apples, will have apples, and every year the consumption will increase, and I am as sure as I am of anything that whenever you produce a good apple and put it on the market you will get a fair price for it; and if you produce a good crop it will happen as it has in the past, when other sections are not producing a great deal you will get enough in one year out of a crop to pay for your land and the cost of all your farm, out of a few acres, out of one crop. If I were in an apple country I would plant apples.

Will it do to trim peach trees before February 1?

The President: That matter was pretty well gone over here yesterday. This question may have been asked by some one who was not here yesterday. I believe they may have a right to the result of yesterday's discussion. Some of our people reported having worked serious injury to trees by cutting off large limbs next to the body and along the body, trimming up severely, while others reported having trimmed orchards in the ordinary manner of trimming, shortening in and thinning out, without harm. It makes a great deal of difference, perhaps, what you mean who have asked the question. Several men here reported nothing but success in winter pruning, shortening in and thinning out the top, but I think the concensus of opinion was that you ought to be a little careful about cutting large limbs close to the body on account of the drying out that may take place there and serious injury resulting.

Having had a piece of sod plowed the 1st of July, and not getting it harrowed thoroughly, and grass coming on to some extent, I crossed-plowed it very shallow last week. Will it do for strawberries the following spring? The soil is clay loam.

Prof. Taft: I think it would depend almost entirely upon whether there were any white grubs in the land or not; that is the thing I should fear mostly. If they were there they should destroy a good many of the plants; but as a rule, where you fall-plow there is far less trouble from that. I should prefer to use a piece that had not been in grass during the year, but if I hadn't anything else I would use this.

What is the proper method of pruning currants?

The President: I will refer that to Mr. Thayer, if he will answer. You have had considerable experience with currants, have you not?

Mr. Thayer: I do not pretend to be an expert on currant-growing, but I follow very much the same plan that we were given in peaches last night. We keep the center of the bush trimmed, keep out the old wood, keep all new wood growing, and trim out so well in the center that we get sufficient sunlight. I think the principle of your peach-farming will apply very nicely to currant-farming also.

A Member: Do you shorten in?

Mr. Thayer: I shorten in; yes, sir. I keep new wood growing all the time. Fay is a complete failure in Wisconsin in all parts of which I know.

What is the cause of pear blight and what is the preventive of the same?

The President: I think Prof. Waite of Washington has gone as far into that as any man, and he has not solved the problem. Prof. Waite, in a lecture, I think it was western New York two years ago, went into it pretty thoroughly, and he had made a discovery that he could prevent the contagion of pear blight going from one tree to another so long as he could keep it coated with copper sulphate, by the use of Bordeaux mixture; but the difficulty was that the contagion took place in the blossoms and at the soft terminals. He sprays everything with copper sulphate on a given day, but by the next morning there are some new shoots out and some new blossoms upon the tree, and they are just as open to contagion as the others were, and a man would need to stand there continuously with a spray pump in order to take care of the trees. That was the result of his investigation.

What is the advisability of sowing cow peas the previous year to setting strawberries? Could they be sown early and turned under and sown again the same season?

Prof. Taft: You would not get much of a second crop. I would rather sow, if I wanted a winter crop, either rye, which would have to be plowed under early in the spring, or perhaps oats that would kill down and be in good shape to turn under in the spring. Either of those. There could only be one crop that amounted to anything.

I would like to hear named the best ten kinds of winter apple.

The President: Mr. Sherwood, what do you find the best for your business? Name the varieties in order of value to you. I suppose this question means from a money standpoint.

Mr. Sherwood: I do not suppose I can name ten. I do not think the ordinary Michigan orchard would warrant the setting of ten varieties; I think perhaps that was the mistake with a great many of our apple men. In fact, all fruit culturists set too many varieties, trying to get a little of each, and I think we should confine ourselves to fewer varieties, better varieties, and study the matter before we set them. From my own experience I believe I would set Greenings, Hubbardston, Northern Spy, Ben Davis, Canada Red, Baldwin, and possibly Golden Russet. This

year's experience has been that the foreign demand has been in favor of Russets and Hubbardstons. I would never set a King under any consideration. King for a time was one of the best apples we had. It is a nice selling apple, but I find that the older orchards of Kings through the state, and it is so all over this state, are dying, showing that the vitality of King is not strong and that it is a weak tree constitutionally.

A Member: What do you say about Oldenburgh?

Mr. Sherwood: That is a summer apple. It is A No. 1.

A Member: What is the matter with Grimes Golden?

Mr. Sherwood: It is a yellow apple.

Mr. Cook: It is a good one, though.

The President: There are some new kinds coming on with great promise. Very few of us know much about them. It seems to me if I were setting an orchard I should have a few Sutton Beauty and a few more that are coming with such fine recommendations.

A Member: How about Belflower?

Mr. Cook: It is an iron-clad, it is good that way; it is not prolific.

A Member: Take Wagener.

The President: That is all right from Grand Rapids north, but not south of that point. It is all right for 1896, but you will wait ten years perhaps before you will see it south of here.

The best five summer apples ?

The President: Now, Mr. Sherwood, what do you say about summer apples?

Mr. Sherwood: That is a hard question to answer. There is a gentleman here who says Red Astrachan. Last year it was not that way, and perhaps it will not be so next year. I think there is no doubt but Oldenburgh is considered to be one of the very best, and there are some new varieties of summer apple that I am not acquainted with, but Oldenburgh, Astrachan, and Alexander are all good.

The President: Alexander did remarkably well this year.

Mr. Sherwood: Yes, remarkably well, but Early Joe did very well with me. It is not a good, clear apple, but it is a regular bearer with me and I like it. It is a little of the color of the St. Lawrence. It has a purplish stripe, a purplish cast. It seems to be a cross between Oldenburgh and Red Astrachan, as near as I can describe it. I think you all know it, it is a summer apple; and Primate is a very fine apple, but it is a poor shipper.

Mr. Slayton: It is the best family apple in the world.

The President: Has any one had any experience with Yellow Transparent? In fruit, I mean.

Mr. Wilde: I have had it fruited now three years, young trees. It is not a red apple, it is yellow, and it is very nice. In town here they call it the white apple, it is so light. It takes well for home consumption, here in town, but I have never shipped it and know nothing about that quality of it. It is the best Russian apple I ever tasted.

Mr. Riehl: With us in southern Illinois we have that apple. It comes into bearing very early and bears well. It is a nice apple, a good apple, but you can not ship it in barrels, you have to ship it just like peaches.

I do not know whether you have the market we have, but it is A No. 1 in Illinois, handled as peaches are handled.

The President: I know that somebody in Illinois is getting a pile of money just now out of Yellow Transparent, and I know that grafted trees in this state are doing exceedingly well, and I think, handled like the peach crop, it is a delicacy at that season. It is a perfectly reliable bearer, and somebody makes good money out of it, because the few shipped from this state have sold for better money for a peck than a bushel of winter apples have.

Mr. Rork: I would ask Mr. Riehl if Charlton Thayler is known in that part of the country?

Mr. Riehl: I don't know that apple.

Mr. Harrison: I think it merits the recognition that is given it here as one of our best summer apples. Of course, it is tender in shipping, it must be carefully handled.

Prof. Taft: We have had this variety, I think, five years in fruit, and while it is not nearly as early with us as Yellow Transparent, by ten days or two weeks, it is a good deal larger and it seems to me fully equal in every other respect, and the trees have borne more than Yellow Transparent. It is larger and a good deal later.

Mr. Sherwood: I would like to ask a question. I have two trees of Late Roman, and they have done remarkably well, and I want to know if some of the southern people here have had any experience with it as a regular bearer. They have borne regularly with me and are a very fine apple. They are as hard as a rock and they will be from now until the first of May.

Mr. Riehl: That is an old apple that we have grown, and at one time was considered a very good apple with us for productiveness and long-keeping qualities, but of late years it has not done well and we have dropped it entirely. I do not consider it a very good quality of apple. It is rather on the sweet order and is not very good. The quality is not high. If you want an apple of that kind I would name Nero for trial. It is a larger apple, of finer quality, and comes into bearing quite early. Let me call your attention to one summer apple that has not been named here, Jefferis, the finest summer apple I have in my orchard. No family orchard should be without it. It has a bright, beautiful yellow splash, is striped with red, and it will take on any stand. If I were growing summer apples for stand trade I would certainly grow that; it is a productive apple.

Mr. Cook: Jefferis does very nicely in this section of country, and is a very nice fall apple, but I think I can make more money out of Gravenstein, treating it as you propose to treat Yellow Transparent, than any of them. It is a better apple for cooking green than most apples when they are ripe. It ripens up like a peach. You have to go over the trees and pick and ship the fruit carefully. It should be taken care of as the peach is, shipped in crates or boxes and put upon the market as it ripens up. When it becomes thoroughly ripe it is the peer of all apples in quality as a tender apple. It will rate with Jefferis, with Shiawassee Beauty, or any of that class of apple in quality.

The best five plums?

The President: Judge Russell, you can name them. If you can not we will find a man who will.

Judge Russell: Well, I have best had success with this late blue plum, the Gueii. It sells well. I should take Winter Damson, Shropshire Damson, Bayay's Green Gage, Lombard, and Grand Duke.

The President: How does that agree with your ideas, Mr. Gebhardt?

Mr. Gebhardt: Well, I don't know. To call out five of the best varieties, I should commence with Black Diamond, in my past year's experience, as the standard of about two hundred varieties; next I should select Monarch, French Damson, Stanton, and perhaps Burbank to make five. I believe they are as good as we can get today.

The President: Judge Russell has mentioned old, well-tried varieties, while Mr. Gebhardt has mentioned two that are practically on trial, Black Diamond and Grand Duke, and not very promising.

Mr. Gebhardt: I did not include Grand Duke. But I have fruited it about five years and I am perfectly well satisfied with it.

The President: This is on trial, and that is only in Oceana county. It has not any general reputation.

Mr. Gebhardt: Black Diamond has been fruited a good many years.

What are the best five peaches?

The President: I know what has done best for me, taking my own locality, but people in Oceana county and people in Kent county may not agree with me. I would name in the order of ripening, for my purposes, either Early Michigan or Lewis for the first; for the next I would name St. John; for the third, Kalamazoo; for the fourth, Elberta, and if you will allow me to put in a variety that is on experiment yet, I would put right there Fitzgerald as likely to beat anything in its season. That makes five.

A Member: Wouldn't you start with Triumph?

The President: I would not start with Triumph until I knew more about it. Mr. Graham, what would you name as the five best varieties of peach for Kent county? Name them in the order of their ripening as nearly as you can. I suppose this has reference to them as a money crop, year in and year out.

Mr. Graham: I do not think I should want to plant anything earlier than Early Crawford.

A Member: Would that be one of the varieties?

Mr. Graham: I should plant some Early Crawfords in Kent county, a good lot of them; following that I would plant Engle; I would also plant Brunson, Elberta, and one later variety than that—perhaps Smock. I have only named standard varieties.

The President: Judge Russell, what would you say for Oceana county?

Judge Russell: Early Michigan, Lewis, St. John, Kalamazoo, Elberta, and perhaps Stevens Rareripe.

The President: You will see by these three lists, with the same character of soil, and so far as its relation to lake Michigan is concerned, that, while we are more than a hundred miles apart, Judge Russell and

I have pretty nearly the same ideas. Back here, on a different character of soil and a little further back, the conditions perhaps become different, and Mr. Graham has changed the varieties a little. That simply illustrates the fact that you can not always tell, when you ask such questions as that, what kind of advice you are going to get. It is best always to search the orchards in your own locality and see what is doing best under your own conditions.

Judge Russell: I skipped Early Crawford from the fact that it always comes in a glut; that is the only reason.

Mr. Graham: I would not set Early Crawford in sandy soil at all, but on heavy land. I think that is one of the very first things to take into consideration in planting trees, the character of the soil. I can not grow good Early Crawfords here on light land, but on heavy land they are one of the most profitable and one of our surest peaches.

The President: Peaches of the Crawford type do well with us on land that is composed of clay and gravel; where white oak grew on the land they do remarkably well, all the peaches of the Crawford type, but remove them from there to our sandy soil that grew beech and maple and they are not nearly so good.

Mr. Cook: Has Barnard gone out on the lake shore?

The President: It has gone out of my orchard. I have a few but I can not get my money out of them.

The best five pears?

Prof. Taft: I hardly know. Of course, it makes a difference whether a list is wanted for market. I should put in Howell, and it depends a little upon location and markets about the others, but possibly Anjou, Lawrence, and in some places further south Kieffer. The first two I would mention are Bartlett and Howell, then Anjou and Lawrence. I should be in a little doubt as to whether to take Clairgeau or Kieffer, and for certain markets Bosc.

A Member: Would you draw the line between Clairgeau and Kieffer by latitude—if you were a little too far north for Kieffer you would take Clairgeau?

Prof. Taft: Yes, sir.

A Member: I would like to know the objection to raising Kieffer in the north.

Prof. Taft: I do not think it does as well, and it does not get so large nor have the quality that it does further south, nor the color.

The President: Mr. Shriver has had a good deal of experience with pears at the south end of the state. What do you say as to the best five varieties of pear?

Mr. Shriver: Well, it is hard to say. I like Clairgeau and Kieffer and Lawrence, Howell and Bartlett, and I think a great deal of Angouleme and Louise Bonne as dwarfs. I have made much money on those per acre.

How much cow peas would you sow to the acre, and would you do it broadcast or in drills?

Mr. Riehl: From a half bushel to a bushel and a half. It depends upon what you want. There are a great many varieties. They may be sown broadcast, but drills do not require any more seed.

A Member: There is a difference in the size of the peas, then, is there?

Mr. Riehl: No, there is a difference in the variety. Some varieties are dwarfs and some grow ten feet high or more.

Do you think the planting of peach trees next spring, in strawberry plantations, would be advisable, provided thorough irrigation is given with cultivation?

The President: If I wanted to do a good business for the nurseryman I would set peach trees in strawberry patches, because I would have to buy another bill of trees, I should think, for next year. Irrigation might be practiced to save them, but I would rather grow strawberries in one field and peach trees in another.

Will it do to plant grapes of any kind in a young peach orchard the first or second year?

The President: This was answered several times during the discussions. It is a common practice to grow from one year up to three or four. The longer you grow them the worse it is for the peach trees.

Is subsoiling on heavy clay soil of much practical advantage in the growing of small fruits?

Prof. Tracy: I should say, certainly, as far as my experience goes; it is on any heavy soil that I have had; it is a very material advantage, and perhaps as valuable work as you can put on a heavy soil, so far as my experience goes.

Does any one know of any harm coming to a peach orchard from sowing and plowing under clover?

The President: I do not think any harm would come from plowing it under; I think the harm would come before it was plowed under.

What is the best method of training and pruning the grape vine?

Mr. Rowe: That is a hard question to answer. It would depend a great deal on the location. My own experience is, I like the renewal system better than anything else. It is a system that is better known. I prefer the renewal system so far as my experience goes.

What treatment would you recommend for strong, thrifty-growing plum trees that do not bear fruit?

Mr. Gebhardt: The best remedy I ever found was to take about two thirds of the top off and graft other varieties in. I find invariably you will have a good crop on such trees.

What is the best way to get rid of the black or yellow spots on peach trees? Is there any preventive thereof?

Prof. Taft: I hardly know what the question refers to, there are so many of these different spots. I have seen a good many of them that I thought were caused by unripened wood and by freezing and thawing. Of course, the way to treat them would be so that the wood would ripen.

The President: What would be the nature of the remedy—there would be no remedy, it would be a preventive, would it not?

Prof. Taft: It would be entirely preventive; yes, sir.

Is there a variety of peach known as Red Crawford, also one known as Late Barnard?

The President: Mr. Harrison, do you know of that?

Mr. Harrison: I do not, only Late Barnard.

Mr. Weed: I believe that the variety called Late Barnard originated in my orchard. They are quite distinct from the other variety. They are two or three days later, I should judge, and they are with me a much larger peach, better in every way, so far as we know.

Mr. Cook: I believe that the peach known as Late Barnard was introduced from the nurseries of Pennsylvania and was brought here for Early Crawford. Isn't that so, Mr. Graham?

Mr. Graham: They were brought here for Late Crawfords, a very large amount of them.

What is the cause and treatment for plum trees dropping their leaves in August?

Professor Taft: I think in nearly all cases the trouble is a fungous disease that eats little holes all through the leaves so that they drop off. The trees, of course, fail to ripen properly, and are often killed. Bordeaux mixture is a remedy for it. We found no trouble in the use of Bordeaux mixture, or some of the copper compounds, late in the season, and this has been entirely effectual.

The President: That is fully explained in your bulletins, is it not?

Professor Taft: Yes, sir.

Would you scatter barnyard manure during winter on ground upon which you intend to grow cabbages during the summer?

Professor Tracy: I should prefer not to. I should delay and put it on in the spring. If I could put it on without being in danger of washing off from freezing ground, I might put it on in the winter. It would depend upon the condition of the soil. If there were danger of it washing off on account of the ground being frozen, I would not put it on until spring. Otherwise I would put it on in the winter.

I would like to know what causes spots on the Barnard peach?

The President: I presume there are a thousand people in the state of Michigan who would like to know the same thing, and a remedy. One thing is noticeable, that these spots or blemishes do not come so badly on peaches grown on high areas (sunny locations) as they do on those on low lands and places where the air is not so much in motion. I presume most people have noticed that, and the fact suggests not a remedy but a preventive in regard to planting such varieties in such locations.

What method should a small peach-grower pursue, one who has but a few hundred trees of mixed and medium-size peaches, in order to gain a reputation for himself and his fruit and obtain highest market prices?

The President: I can tell a man how to sell it for what it is worth. Pack it just as well as it appears to be, and take your chances on any peach market.

Is it advisable for a young fruitgrower to go into debt at the present time to extend his business?

Mr. Riehl: It depends on the man. I have done it, Mr. Hale has done it; and thousands of others have tried it and did not succeed. It depends on the man.

Mr. Stevens: There is always room on the top for a good, energetic young man who is willing to work and push himself forward to success.

Why is it that a peach orchard that has been well cultivated and made a very rapid growth did not bear when one that had never been well cultivated bore well? Both orchards were three years old.

Mr. Harrison: I think perhaps there were different varieties.

Mr. Slayton: And the soil and the location were different.

Should a man grow everything he fancies he would have a liking for, or would he better make a specialty of a few branches?

The President: I would say that would depend entirely upon his capacity. The most successful men do not reach for too much; they reach for what they can accomplish.

Mr. Morrill, would you set plums in an old apple orchard from which the apple trees had been removed the previous fall? If not, what would you do with the ground?

The President: I will give it up. I do not think, though, that I would set plum trees on such land, because it has already been bearing largely of fruits requiring the same ingredients. Ordinarily we find an old apple orchard in good condition for grain crops, potatoes, or anything of that character, in our country. I do not know what character of soil this is, or anything about it, but ordinarily I like to put orchards on other land.

Mr. Perkins: I have a plum orchard I set three years ago the coming spring, and I do not think anything in the country can be better. The apple trees were taken out and moved.

The President: Has your plum orchard begun bearing?

Mr. Perkins: Yes, sir.

Mr. Smith: I would put the plum trees just where the apple trees were.

Mr. Perkins: I planted the plum trees sixteen feet apart.

The President: I don't think that would make much difference, anyway. A great deal, as I say, depends upon the soil.

To what extent does the heavy importation of bananas affect the demand and consumption of home-grown fruits?

Mr. Garfield: I should rather put the question the other way. It is a question of whether we can keep bananas out by raising good fruit enough for the people to satisfy them. If we furnish apples that are good enough, and plenty of them, we need not fear the bananas, because the apple is a better fruit than the banana; and our northern fruits, if they are raised in good quality instead of poor quality, will certainly take the place of the southern fruits that are imported. The trouble is, we distinguish too strongly between the fruit that we put on the market and

the fruit that we like to put into our mouths. You never can supplant the banana with the Baldwin apple or a Ben Davis. The banana is superseding the Baldwin apple, but it is not superseding Hubbardston or Jonathan. The trouble is, we haven't, for the people who are willing to pay for such things, the quality in the market. Almost any one would rather have a banana than a Baldwin apple, and almost any one who has any good taste at all would rather have a Jonathan apple than a banana or a melon.

Mr. Cook: If we could wipe out the apples Mr. Garfield suggests, the poorer qualities, and put in their places the good ones, there would not be any trouble on that line. Now, it seems to me that the true theory is for our farmers to cut down an apple tree that is not good for anything, and graft it to something that is good—not put it on the market at all.

What is best as to a pear orchard, to prevent blight—leave it in sod or cultivate it?

The President: That ground has been fought over, every inch of it, ten or fifteen or twenty years and I don't believe any one knows anything more about it than he did.

Mr. Russell: A part of my peach and plum orchard is on first-class heavy clay ground, rather rolling, and I am having a great deal of difficulty this year about its washing. I never had any before. I would like to know what is the best thing to do.

The President: During the summer months, while you were cultivating it?

Mr. Russell: Yes, sir; and in the fall.

Mr. Cook: In the south, to prevent washing of lands, they plow around the hills, plow in circular form. You will find that in all the hilly country in the south, so far as I have seen, they plow in that way; they do not make any straight lines. If their land washes very readily, and if they have a hill, they will plow around it in a circle so that each furrow forms a sort of dam to prevent the water from going below.

The President: That does not suit Judge Russell's case, because his orchard is all set in straight rows. I have had a little trouble in that line in my own orchards, the starting of gulleys when we got through cultivation in the fall, and in the spring when the frost is coming out. The first thing I do is to take some of the short trimmings out of the orchard and place them in bunches in the gulley with the butts upstream. I do not care if the gulley is but ten feet long, we will put some of that fine brush there, which we know will rot within a year, and shovel earth on, and commence the cultivation across the hills as much as possible, and it will not wash again for a year or two on top of that. The earth will gradually fill up and the brush will rot. By this method I have had good success.

A Member: Do you bind them in bundles?

The President: No, just gather them up any way. A man gathers them as rapidly as he can, with his hands, dragging them in, and takes a shovel and throws a little earth on to hold them until a team passes over with a cultivator.

A Member: Mr. Morrill has been telling us that he cultivates his orchard about thirty or thirty-five times per year. I wish to know if that cultivation wouldn't stop it.

Mr. Morrill: The finer the condition of the soil the better the condition for washing, and when the frost comes out in the spring and you get a heavy rain the soil washes so much the more readily.

A NEW FERTILIZER.

Mr. Garfield: I wish to call the attention of the society to a novel state of affairs. Some years ago a family in this town sent east to get furniture to furnish their house nicely, and it was found afterward, from some markings on the under side of the furniture, that it was Grand Rapids furniture after all. Not long ago, within the last ten years, we have had Clapp's Favorite pears sold here upon the market, upon our fruit stands, that were raised upon the lake shore, shipped to Chicago, rolled up in fine tissue paper, and brought back here and sold as California pears. Now this is preliminary to a thing, perhaps, that most of you do not know about, with reference to our town today. We are shipping in fertilizer from various localities, sold at from \$20 to \$50 per ton. There is an institution that hardly any one knows about in this town, that has a waste product that is shipped from here to Germany. The entire product is sold in Germany for fertilizing purposes. I wish to call your attention to an anomalous condition of affairs, that we have a by-product here that is shipped by the carload, almost the shipload, to Germany to fertilize orchards, and here we are shipping in fertilizers at \$25 to \$50 per ton from Germany. It is the by-product, castor bean pomace, from the fly-paper factory of the Thums. They throw away about two tons per day, I understand, and as soon as they get a carload they ship it to New York and it is sent to Germany in bulk. I do not know the price they get for it, but I presume they get somewhere from five to eight dollars per ton. The way I came to know about it is that our experiment station has just analyzed it, and it has nitrogen and phosphorus and potash in just about the quantities that we have in oil meal.

CONSTITUTION AND BY-LAWS.

ARTICLE I.—NAME, TERRITORY AND OBJECTS.

The name of the society shall be the Michigan State Horticultural Society, and its territory shall be the state of Michigan. Its objects shall be the development of an adequate appreciation of the peculiar adaptation of the soils and climate of the state to the pursuit of horticulture in all its branches; and the collection and dissemination of information bearing upon the theory and practice of the same, as well as upon the arts and sciences directly or indirectly associated therewith, or calculated to elevate or improve the practice thereof.

ARTICLE II.—OFFICERS AND MODE OF ELECTION.

The officers of the society shall be a president, a secretary, and a treasurer, together with an executive board of six members, aside from the president, secretary and treasurer, who shall be *ex officio* members of the said board.

Said board shall designate one of its members as vice-president. The officers shall be elected by ballot.

The society may, at its discretion, elect an honorary president, whose term of office shall be for life, said office to be an honorary one, without duties, and established to express the sense of obligations which the society may feel to one of its members who may unselfishly give a lifetime of earnest effort to promote its interests, to further the horticultural interests of this state.

ARTICLE III.—A QUORUM.

Four members of the executive board shall constitute a quorum for the transaction of business at any meeting of said board: *Provided*, That each of the members thereof shall have been notified, in the usual manner, of the time, place, and object of such meeting.

ARTICLE IV.—ANNUAL MEETING AND ELECTION OF OFFICERS.

The annual meeting of the society, for the election of officers specified in Article II, shall occur upon the first Wednesday of December in each year.

ARTICLE V.—TERMS OF OFFICE.

The officers specified in Article II shall hold their offices until the thirty-first day of December of the year for which they were elected, and thereafter until their successors shall have been elected, and shall have signified to the secretary their acceptance: *Provided*, That the terms of office of the six members of the executive board shall be so arranged that but two regular vacancies shall occur in each year.

ARTICLE VI.—ANNUAL AND LIFE MEMBERS.

Any person may become a member of the society for one year by paying to the treasurer the sum of one dollar; and the yearly term of all annual memberships shall expire on the thirty-first day of December of the year for which they were taken, but be regarded as continuous, except as may be provided by the by-laws. Any person may become a life member by the payment at any one time of the sum of ten dollars into the treasury of the society.

ARTICLE VII.—AMOUNT OR LIMIT OF PROPERTY.

The society may hold real and personal estate to an amount not exceeding twenty thousand dollars.

ARTICLE VIII.—BY-LAWS.

By-laws for the government of the society shall be framed, and when needful, amended by the executive board; but changes thereof may be at any time proposed by the society in general meeting.

ARTICLE IX.—AMENDMENTS.

This constitution may be amended at any regular meeting of the society by a vote, by ballot, of two-thirds of all the members present and voting: *Provided*, That notice of such proposed amendment, specifying its purport, shall have been given at the last previous regular meeting.

BY-LAWS OF THE MICHIGAN STATE HORTICULTURAL SOCIETY.

I.—THE PRESIDENT.

1st. The president shall be the executive officer of the society, and of the executive board; and it shall be his duty to see that the rules and regulations of the society, and of the executive board, are duly enforced and obeyed.

2d. He may, in his discretion, and in the lack of needful rules, during the recesses of the society and of the board, prescribe rules for the management of the interests or business of the society, such rules to continue in force till the next session of the executive board, and until, by its action, they shall have become no longer necessary.

3d. He shall act in conjunction with the secretary in the preparation of programmes or orders of business, for the sessions of the society; and in the devising of plans and processes for the maintenance of its interests.

4th. He shall have the best interests of the society at heart, and shall lead in forwarding any and all enterprises calculated to add to its permanency or to increase its usefulness, and establish it more firmly in the public confidence.

II.—VICE-PRESIDENT.

The vice-president shall perform the duties of the president in case of the absence or inability of that officer; and may be called upon by the president to assume the duties of the chair at any meeting of the society or executive board.

III.—THE SECRETARY.

1st. The secretary shall be the recording, corresponding, and accounting officer of the society, and he shall also be, jointly with the business committee, its financial and auditing officer.

2d. He shall incur no expenditure of a large or doubtful character except with the sanction of the executive board or of the business committee.

3d. He shall submit all bills or claims against the society to the business committee for approval, and indorsement to that effect, before drawing his order upon the treasurer for the payment of the same.

4th. He shall attend all meetings of the society, and of the executive board, and shall keep a faithful record of their proceedings.

5th. He shall sign all certificates of membership, and all diplomas and certificates of merit awarded by the society.

6th. He shall have charge of the society's books and papers, excepting only such as, by the advice or direction of the executive board, shall be placed in charge of the librarian, and he shall be responsible to the board for the safe keeping of the property placed in his charge.

7th. He shall be the custodian of the seal of the society, and shall have authority to affix the same to documents when needful.

8th. He shall seek by all suitable means to secure the fullest announcement of the meetings of the society in this state, as well as in adjacent states, when such shall be found desirable.

9th. He shall, so far as practicable, cause the transactions of the society, together with such valuable or interesting papers as shall be read at its sessions, to be properly published, and thus placed within reach of the state.

10th. It shall also be his duty, yearly, to prepare for publication the annual report of the society, together with such other matter as he shall deem proper—he being aided in the selection of such matter by an advisory committee of the executive board.

IV.—THE TREASURER.

1st. All the funds of the society shall be paid into the hands of the treasurer.

2d. He shall disburse the moneys of the society that shall come into his hands only upon the order of the secretary, countersigned by the president.

3d. He shall keep the moneys received by the society for life memberships as a distinct fund, and shall invest the same under the advice and direction of the executive board, applying only the interest accruing thereon to the purposes of the general fund.

4th. Immediately upon assuming his office, and before entering upon its duties, he shall execute to the society an official bond with sufficient sureties, conditioned for the safe keeping and disbursement of the moneys of the society, and for the proper discharge of the further duties of his office, in such sum as shall be specified by the executive board. Such bond shall receive the approval of the president and shall be deposited with the secretary.

5th. He shall, at the close of each year, report to the executive board the amount of money that shall have come into his hands during the year, the sources from which it has been derived, and the disposition made of the same.

V.—THE LIBRARIAN.

1st. The Librarian shall have the custody of the library of the society. He shall be appointed by the executive board, and may be displaced at its pleasure.

2d. He shall act jointly with the secretary in the care and arrangement of the same, and in the reception, custody, and disposal of the volumes of the transactions annually supplied to the society by the state.

3d. He shall have the custody of the rooms assigned to the society at the state capitol, together with such books and other property as the society or the board shall direct to be deposited therein.

4th. He shall report annually, at the close of the year, to the executive board the amount and condition of the property in his hands.

VI.—THE EXECUTIVE BOARD.

1st. The executive board shall enact all rules and regulations for the management of the affairs of the society, determine the salaries of its officers, and assume the control and management of its exhibitions.

2d. It shall have power to displace any officer of the society for neglect of duty or abuse of position, and to fill all vacancies by appointment, to continue till the next annual election.

3d. The board shall hold four regular sessions during the year, to occur at the times and places for the regular meetings of the society.

4th. Other meetings may be called by the secretary under the advice or direction of the president, or of a majority of its members, at such times and places as may be deemed most convenient; but in all such cases each member must be notified of the time, place, and object of such meeting.

5th. It shall be the duty of the board to carefully guard the general interests of the society, to watch over its finances, and to provide for its necessities as they shall arise.

6th. All important measures shall be submitted to this board, but they may by the board be resubmitted to the society for recommendations.

7th. The board shall, at the annual meeting, submit through the secretary, in connection with the reports of officers, such further report upon the condition, interests, and prospects of the society as it shall judge necessary or expedient.

8th. Two members of the executive board are to be elected each year, to hold the office for three years, but if any such member shall absent himself from two or more consecutive meetings of the society and of the board, without reason satisfactory to the board, the said board may, in its discretion, consider the office vacant, and proceed to fill such vacancy by appointment, to continue to the next annual election.

VII.—THE BUSINESS COMMITTEE.

1st. It shall be the duty of the executive board, annually, upon entering upon the duties of the new year, to appoint from their own number three members who shall constitute a business committee for the year.

2d. All accounts or claims against the society, when presented to the secretary for payment, shall, before payment, receive the sanction and indorsement of the business committee.

3d. Such claims shall be submitted to this committee and approved in duplicate, one copy to remain with the secretary as his warrant for the payment of the same, and the other to be transmitted by him to the president, along with his order upon the treasurer, as his warrant for countersigning the same.

4th. It shall be the duty of the business committee, upon application of the secretary, during the recess of the executive board, to advise with him as to the expediency of making any contemplated but questionable expenditure for which occasion may arise during such recess.

VIII.—STANDING COMMITTEES.

1st. There shall be a standing committee on revision of the catalogue, to be composed of one member from each of the five districts into which the state is, for this purpose divided, with one member chosen from the state at large, who shall be the chairman of the committee.

2d. Each member of said committee (except the chairman) is empowered and expected to choose a sub-committee for his district, of which he shall be chairman.

3d. It shall be the duty of each sub-committee to collect and report, each year, to the general chairman, such facts respecting fruit culture in the district as shall promise to be of value in the revision of the catalogue.

4th. There shall be a standing committee on new fruits, to consist of a chairman, with as many associates as such chairman shall find it desirable to appoint.

5th. Such other standing committees may from time to time be appointed by the executive board as, in its discretion, it shall deem desirable or necessary.

6th. All standing committees are expected to report at the annual meeting in December, any information of value to the society or its members that may have come to their knowledge during the year, as well as any scientific theories, deductions, or facts that, in their opinion, may be useful in advancing the objects for which the society is laboring.

IX.—LIFE MEMBERSHIP FUND.

1st. All moneys coming into the treasury of the society in payment for life memberships shall constitute a perpetual fund, to be known as the life membership fund.

2d. The principal of this fund shall be invested by the treasurer under the advice and direction of the executive board.

3d. All interest accruing upon any portion of said fund shall constitute and become a part of the fund of the society devoted to the payment of its ordinary expenses.

X.—MEETINGS OF THE SOCIETY.

1st. The society shall hold its first regular meeting for the year during the month of January or February for the inauguration of the officers chosen at the annual meeting held the previous December, as provided in article IV of the constitution, and also to arrange its plan of operations for the year.

2d. Its second regular meeting shall be held in the month of June at such date as shall best accommodate an exhibit of the early summer fruits.

3d. Its third regular meeting shall be at its annual exhibit of autumn and winter fruits, in the month of September or October.

4th. Its fourth regular meeting shall occur in connection with its annual election of officers, in December, as provided in article IV of the constitution.

5th. The times and places for the occurrence of these regular meetings (excepting only the *time* of the annual meeting), shall be determined by the executive board.

6th. Other meetings may be called by the secretary, under the advice or direction of the members of the executive board, at times and places by them deemed expedient.

7th. In case of the calling of a special meeting for the election of officers of the society, in consequence of any failure to elect at the annual meeting, as provided in section IV of the constitution, all persons entitled as members to vote at such annual meeting shall be considered as retaining such membership for such purpose until such election, and until such officers so elected shall have been inducted into office.

XI.—RULES FOR DISCUSSIONS, ETC.

1st. The deliberations and discussions of the society shall be conducted in accordance with ordinary parliamentary usages.

XII.—AUXILIARY SOCIETIES.

1st. The society shall, in all reasonable and proper ways, encourage the formation of local horticultural or pomological societies auxiliary to this society in all such counties or other municipalities of this state, as shall afford a reasonable prospect that they will be able to effectually maintain the same.

2d. It shall be the policy of this society in supervising the organization of such local societies to secure an identity of constitutional provisions throughout, and in so doing to insure harmony among them; but at the same time it will not discourage the including by them of special or local objects in cases in which such shall be found desirable, so long as the introduction of the requisite provisions therefor into the constitution and by-laws of the auxiliary society shall not be deemed likely to interfere with the harmonious workings of the whole.

3d. Any person who shall become a member of an auxiliary society for one year, and comply with its regulation as to fee, shall thereby become an auxili-

ary member of this society also for the same time, and entitled to all the rights and benefits of full membership, except that he or she shall not have the right to vote at the annual election of officers or upon questions of the expenditure of money.

4th. On receipt by the secretary, from the secretary of such an auxiliary society, of a list of officers and members of that society, he shall file the same; and upon issuance of the Annual Report shall supply such auxiliary society with a sufficient number of volumes to provide one for each of its members. He shall also transmit the names of such officers and members, with their postoffice addresses, to the secretary of any and all experiment stations and societies willing to supply bulletins and reports and to the national department of agriculture for the same purpose; and the secretary shall issue to such auxiliary society a certificate of membership for the year.

5th. Reports of auxiliary societies shall be made to the secretary of this society on or before the fifteenth day of January of each year, and shall include the officers for the ensuing year and a statement of the proceedings of such society during the past year, which shall be incorporated into the Annual Report of the preceding year.

XIII.—AMENDMENTS, ADDITIONS, SUSPENSIONS.

1st. Amendments or additions to these by-laws may be made by a majority vote of the executive board, at any meeting; but if objections shall be made the same shall "lie upon the table" till the next regular meeting of the board.

2d. These by-laws, or any one or more of them, may be suspended for the time, by order of a majority of all the members of the society present and voting.

3d. A proposition in the general meeting of the society for an amendment or addition to these by-laws shall be referred to the executive board for consideration and decision; but the society may submit therewith its advice or request.

LAWS OF MICHIGAN RELATING TO HORTICULTURE.

YELLOWS AND BLACK KNOT.

AN ACT to prevent the spread of the contagious diseases known as yellows, black knot, peach rosette, and pear blight among peach, plum, cherry, prune, almond, apricot, nectarine, and pear trees, or the fruit thereof, by providing measures for the eradication of the same, and to repeal act number one hundred twelve of the public acts of eighteen hundred ninety-three, approved May twenty-fifth, eighteen hundred ninety-three.

[Act 109, Laws 1895.]

SECTION 1. *The People of the State of Michigan enact,* That it shall be unlawful for any person to keep any peach, almond, apricot, plum, prune, cherry, nectarine or pear tree infected with the contagious diseases known as yellows, black knot, peach rosette or pear blight, or to offer for sale or shipment or to sell, or to ship any of the fruit thereof, except the fruit of the plum, cherry and pear tree; that both tree and fruit so infected shall be subject to destruction as public nuisances as hereinafter provided. No damages shall be awarded in any court in the State for entering upon the premises and destroying such diseased trees, or parts of trees, or fruit, if done in accordance with the provisions of this act. It shall be the duty of every person as soon as he becomes aware of the existence of such disease in any tree, parts of trees, or fruit owned by him, to forthwith destroy, or cause said trees or fruit to be destroyed.

SEC. 2. In any township or city in this State in which such contagious diseases exist, or in which there is good reason to believe they exist, or danger may be justly apprehended of their introduction, it shall be the duty of the township board or city council, as soon as such information becomes known to either such board or council, or any member thereof, to appoint forthwith three competent freeholders of said township or city, as commissioners, to be known as yellows commissioners, who shall hold office during the pleasure of said board, or city council, and such order of appointment and of revocation shall be entered at large upon the township or city records: *Provided,* That the commissioners now appointed and in office shall continue in said office until their successors are appointed and qualified: *Provided,* That in case commissioners have already been appointed to prevent the spreading of bush, vine and fruit tree pests, such commissioners shall be *ex officio* commissioners under this act.

SEC. 3. It shall be the duty of said commissioners, within ten days after appointment as aforesaid, to file their acceptances of the same with the clerk of said township, or city, and said clerk shall be *ex officio* clerk of said board of commissioners and he shall keep a correct record of the proceedings of said board in a book to be provided for the purpose, and shall file and preserve all papers pertaining to the duties and actions of said commissioners, or either of them, which shall be a part of the records of said township or city.

SEC. 4. It shall be the duty of the commissioners, or any one of them, upon, or without complaint, whenever it comes to their notice that either of the diseases

known as yellows, black knot, peach rosette or pear blight exist, or are supposed to exist within the limits of their township, village or city, to proceed without delay to examine the tree or fruit supposed to be infected, and if the disease is found to exist, a distinguishing mark shall be placed upon the diseased trees, and the owners notified personally, or by a written notice left at his usual place of residence, or if the owner be a non-resident, by leaving the notice with the person in charge of the trees or fruit, or the person in whose possession said trees or fruit may be. The notice shall contain a simple statement of the facts as found to exist, with an order to effectually uproot and destroy, by fire, or as the commissioner shall order, the trees so marked or designated, or such parts thereof, within five days, Sundays excepted, from the date of the service of the notice, and in case of fruit so infected, such notice shall require the person in whose possession or control it is found to immediately destroy the same, or cause it to be done, or the commissioner may destroy the same. Said notice and order to be signed by one or more of the commissioners.

SEC. 5. In case any person who is interested in any tree or trees so ordered to be destroyed shall feel aggrieved by such order and shall believe that such trees are not so diseased, he may serve a written notice upon all of the commissioners in the township in which such trees are situated, which notice shall specify the part of such order to which objection is made and the particular tree or trees included in such order which it is claimed are not so diseased and shall request an examination of such tree or trees by all of said commissioners, which notice shall be served personally upon each of said commissioners within the five days given for the destruction of said trees, and it shall thereupon be the duty of all of said commissioners who have not already done so to personally examine such tree or trees as soon as practicable, and within said five days, and if a majority of all the commissioners shall agree that such tree or trees are so diseased, they shall order the same to be destroyed forthwith by the owner or custodian thereof, but if a majority shall decide that such tree or trees, or any of them, are not so diseased, they shall revoke the order of the commissioner to destroy the same so far as it relates to the trees so found to be free from disease, but this section shall not apply to fruit ordered to be destroyed.

SEC. 6. Whenever any person shall refuse or neglect to comply with the order to remove and destroy the trees or parts of trees so designated and marked by the commissioner as aforesaid, it shall become the duty of the commissioner to cause said trees or parts of trees to be removed and destroyed forthwith, employing all necessary aid for that purpose. The expenses for such removal and destruction of trees or parts of trees to be a charge against the township or city, and for the purpose of such removal [and] or destruction, the said commissioners, their agents and workmen, shall have the right and power to enter upon any and all premises within their township or city.

SEC. 7. If any owner neglects to uproot and destroy or cause to be removed and destroyed as aforesaid, such diseased trees, or parts of trees, or fruit, after such examination and notification, and within the time hereinbefore specified, or any other person who shall sell or offer for sale such diseased fruit, such person shall be deemed guilty of a misdemeanor, and punished by a fine not exceeding one hundred dollars or by imprisonment in the county jail not exceeding three months, or both, in the discretion of the court, and any justice of the peace of the township or city where such trees may be, or where such nursery stock or fruit is sold, shipped, disposed of, or delivered as aforesaid, shall have jurisdiction thereof. The words "parts of trees," wherever used in this act, shall refer to black knot and pear blight only, and not to trees affected with yellows.

Am. P. A. 1897, act 110. SEC. 8. The commissioners shall be allowed for services under this act, two dollars for each full day, and one dollar for each half day, and their other charges and disbursements hereunder, to be audited as well as any other charges and disbursements under this act, by the township board or city council, all of which costs, charges, expenses and disbursements, shall be certified by the commissioners to the supervisor or city council on the first day of October of each year. Said certificate shall describe the lands on which such diseased trees stood, and the expense incurred in removing the same. The amount so certified shall be levied by the supervisor upon the premises described in said certificate, the owners or occupants of which having refused to remove and destroy said diseased trees as required in this act. The amount so levied shall

be collected in the same manner as delinquent highway taxes are collected, and shall be paid into and belong to the general fund of the township or city as the case may be.

SEC. 9. All of act number one hundred and twelve of the public acts of eighteen hundred and ninety-three be and the same is hereby repealed.

SPRAYING.

AN ACT to amend act number one hundred eight, session laws of eighteen hundred ninety-five, entitled "An act to prevent the spreading of bush, vine and fruit tree pests, such as canker worm and other insects, and fungus and contagious diseases, and to provide for their extirpation."

[Act 2, Laws 1897.]

SECTION 1. *The People of the State of Michigan enact*, That act number one hundred eight of the public acts of eighteen hundred ninety-five, entitled "An act to prevent the spreading of bush, vine and fruit tree pests, such as canker worm and other insects, and fungus and contagious diseases, and to provide for their extirpation," be and the same is hereby amended so as to read as follows:

SECTION 1. *The People of the State of Michigan enact*, That it shall be the duty of every owner, possessor, or occupier of an orchard, nursery or vineyard, or of land where fruit trees or vines are grown, within this State, to spray with a poisonous solution or disinfectant and of sufficient strength to destroy such injurious insects or contagious disease, all fruit trees or vines grown on such lands which may be infested with any injurious insect or worm, or infected with any contagious disease known to be injurious to fruit or fruit trees or vines: *Provided*, That if such trees and vines are infested with the San José or other scale insects, such trees or vines shall be either effectually sprayed or destroyed: *Provided, also*, That no such spraying shall be done while said fruit trees or vines are in blossom, except in case of canker worm.

SEC. 2. In any township in this State where such injurious insects or contagious diseases are known to exist or in which there is good reason to believe they exist, or danger may be justly apprehended of their introduction, it shall be the duty of the township board, upon the petition of at least ten freeholders of such township, to appoint forthwith three competent freeholders of said township as commissioners, who shall hold office during the pleasure of the board, and such order of appointment and of revocation shall be entered at large upon the township record: *Provided*, That in townships having a board of yellow commissioners, such commissioners shall be *ex officio* commissioners under this act.

SEC. 3. It shall be the duty of said commissioners within ten days after appointment as aforesaid, to file their acceptance of the same with the clerk of said township, and said clerk shall be *ex officio* clerk of said board of commissioners, and he shall keep a correct record of the proceedings of said board in a book to be provided for that purpose, and shall file and preserve all papers pertaining to the duties and actions of said commissioners, or either of them, which shall be a part of the records of said townships.

SEC. 4. It shall be the duty of said commissioners or any one of them, upon, or without complaint, whenever it comes to their notice, that any orchard, fruit trees or vines are infested with canker worm or other injurious insects or contagious disease, within their townships, to proceed without delay to examine such orchards or vineyards, supposed to be infested, and if such injurious insects or contagious diseases are found to exist, the owner shall be notified personally, or by a written notice left at his usual place of residence, or if the owner be a non-resident, by leaving the notice with the person in charge of the trees or vines, or the occupant of the lands upon which such trees or vines shall be grow-

ing. The notice shall contain a simple statement of the facts as found to exist with an order to effectually destroy such injurious insects or worms or contagious disease by spraying such trees or vines with a poisonous solution, or in case of contagious disease to effectually disinfect said diseased trees or vines, or in case of San José or other scale insect to effectually spray or destroy such infested trees, within such time from the date of the service of the notice as such commissioners shall designate, said notice and order to be signed by the full board of commissioners.

SEC. 5. Whenever any person shall refuse or neglect to comply with the order to spray or disinfect the orchards or vineyards designated by the commissioners, as aforesaid, or in case of San José or other scale insects to effectually spray or destroy such infested trees, it shall become the duty of the commissioners to cause said trees or vines to be effectually sprayed with a poisonous solution or disinfectant as occasion should require, or in case of San José or other scale insect to effectually spray or destroy such infested trees forthwith, employing all necessary aid for that purpose, and the expenses for the same shall be a charge against the township, and for said spraying, disinfecting or destroying, the said commissioners, their agents or workmen, shall have the right and power to enter upon any and all premises within their township.

SEC. 6. If any owner, township officer, or commissioner, neglects or refuses to comply with the requirements of this law as set forth in the preceding sections and within the time therein specified, such person shall be deemed guilty of a misdemeanor, and punished by fine not exceeding fifty dollars or imprisoned in the county jail not exceeding sixty days, or by both such fine and imprisonment in the discretion of the court, and any justice of the peace of the township where such trees or vines may be growing shall have jurisdiction thereof.

SEC. 7. The several commissioners shall be allowed for service under this act two dollars for each full day, and one dollar for each half day, and their other charges and disbursements hereunder to be audited as well as any other charges and disbursements under this act by the township board, all of which costs, charges, expense and disbursements shall be recovered by the township from the owner of said infected or infested orchards or vineyards, or from the owner of the premises on which said trees or vines may be growing, in an action of assumpsit. The provisions of this act shall not apply to the contagious disease known as yellows.

NURSERY INSPECTION—SAN JOSÉ SCALE.

AN ACT to prevent the introduction or spread of San José scale or other injurious insects or infectious diseases of trees, vines, shrubs or plants grown in this State or imported from other states, provinces or countries.

[Act 137, Laws 1897.]

SECTION 1. *The People of the State of Michigan enact,* That it shall be the duty of the State Board of Agriculture, immediately upon the taking effect of this act, to appoint some competent person who shall be known as State inspector of nurseries and orchards, who shall hold office during the pleasure of said board, whose duty shall be to inspect any and all nurseries in the State of Michigan, as to whether they are infected by San José scale or other injurious or destructive insects or infected with infectious or contagious diseases, and if upon such inspection he find no such dangerous insects or diseases, he shall upon payment of per diem fee hereinafter provided, give to the owner of such nurseries a certificate to that effect, and shall file a duplicate certificate with the State Board of Agriculture; and in case he shall find present in any such nursery any of said dangerous insects or diseases, he shall notify the owner thereof in writing, and shall direct him within five days to use such means as will exterminate such dangerous diseases or insects, and the owner of such nursery shall not ship nor deliver any

such trees, vines, shrubs or plants affected by such dangerous insects or diseases until he shall have secured from said inspector a certificate as aforesaid.

SEC. 2. The owner of such nursery, trees, vines, shrubs or plants shall, within the time specified in such notice, take such steps for the destruction of such insects or diseases as will exterminate the same, and he shall not ship nor deliver any such trees, vines, shrubs nor plants affected with such dangerous diseases or insects under the penalty of a fine of one dollar for every tree, vine, plant or shrub so affected, when shipped or delivered from such nursery, which fine shall be collected by suit by the prosecuting attorney of the county in which said nursery is located.

SEC. 3. Whenever it shall happen that the State inspector of nurseries and orchards shall give the notice heretofore required to the owner of a nursery, for the destruction of the insects or diseases mentioned, and said owner shall fail or neglect to take the measures necessary for the destruction thereof, within the time mentioned in the notice given him, it shall be the duty of the State inspector of nurseries and orchards to have the proper remedies applied to such nursery for the destruction of such diseases or insects, and shall employ all necessary assistance and may enter the premises of said owner of such nursery for the purpose of treating and exterminating such insects or diseases, and the said owner of such nursery shall be liable for the costs of such proceeding, for the services of the inspector at a rate per diem to be fixed by the State Board of Agriculture, not to exceed three dollars per day, and for such number of days as said board shall determine, which said charge must be paid before delivery of the certificate in section one of this act.

SEC. 4. Whenever any trees, shrubs, plants or vines are shipped into this State from another state, country or province, every package thereof shall be plainly labeled on the outside with the name of the consignor, the name of the consignee, the contents, and a certificate showing that the contents have been inspected by a state or government officer, and that the trees, vines, shrubs or plants therein contained appear free from all injurious insects or diseases. Whenever any trees, shrubs, vines or plants are shipped into this State without such certificate plainly fixed on the outside of the package, box or car containing the same, the fact must be reported within twenty-four hours to the State Board of Agriculture by the railway, express or steamboat company, or other person or persons carrying the same; and any agent of any railway, steamboat or express company, or any other person or persons who shall violate the provisions of this section shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in any sum not less than twenty-five nor more than one hundred dollars, or imprisonment in the county jail not less than five nor more than thirty days, or may be so fined and imprisoned in the discretion of the court, and any such fine shall be paid to the State Board of Agriculture.

SEC. 5. Any person or persons growing or offering for sale in this State any trees, vines, shrubs or plants, commonly known as nursery stock, shall, on or before the first day of August in each year, apply to the State Board of Agriculture, for inspection of said stock under the provisions of this act and a license for its sale, and shall deposit with said board a fee of five dollars as a license fee for himself as principal. Such license shall be good for one year and shall not be transferable, and each of such persons, principals, shall execute to the State Board of Agriculture, a bond, in the sum of one thousand dollars, with good and sufficient sureties satisfactory to said board, conditioned that he will comply with all the provisions of this act, and that upon demand he will file with the State Board of Agriculture, a list of the persons to whom he has sold or delivered any such nursery stock, giving the species, together with the postoffice address of each purchaser, which list shall be held in strict confidence by the said State Board of Agriculture, and not be subject to inspection by the public. Failure on the part of any nurseryman, grower, agent or dealer to comply with the provisions of this section shall render him or them liable to the penalties of a fine of not more than one hundred nor less than twenty-five dollars, or imprisonment in the county jail for not more than ninety nor less than thirty days, or both such fine and imprisonment in the discretion of the court, for each and every such sale. Such information shall be preserved and be for the sole use of the nursery and orchard inspector and his deputies: *Provided*, That the provisions of the preceding sections shall not apply

to persons engaged in fruit growing, who are not nurserymen, who desire to sell or exchange surplus trees or plants of their own growing.

SEC. 6. No person, firm or corporation resident of another state, province or country shall engage or continue in the business of importing any trees, plants, shrubs or vines, commonly known as nursery stock, into this State, or of selling such importations within the State, or of selling such articles within the State, for subsequent importation into it, without first having obtained from the State Board of Agriculture a license to do business in this State as provided in section five of this act, and shall have filed with the State Board of Agriculture the bond therein required, together with a certificate of inspection by a state or government inspector or that of some person designated by the Michigan State Board of Agriculture for such purpose.

SEC. 7. The State Board of Agriculture shall, upon receipt of the fee referred to in this act, together with the required bond and a satisfactory certificate of inspection, issue licenses to the applicant according to the provisions of this act.

SEC. 8. Whenever the commissioners under acts number one hundred and eight and one hundred and nine, session laws of eighteen hundred and ninety-five, known as yellows commissioners, shall be uncertain as to the existence or nature of any infectious or contagious disease or dangerous insect pest in an orchard or elsewhere, or in case any dispute shall arise between owners and commissioners, it shall be the duty of said commissioners to notify the State inspector of orchards and nurseries, who shall at once investigate or inquire into the matter and suggest or recommend the proper remedies, and give all the information he can to aid in exterminating such insects or diseases, and his decision of the case and recommendation shall be final.

SEC. 9. It shall be the duty of the State inspector, whenever it shall come to his knowledge that any destructive insects or infectious or contagious diseases exist in any orchard in this State, or are supposed to exist, to investigate the case, and if such dangerous insects or diseases are found, he shall have authority to enter upon the premises and proceed according to the provisions of sections one, two and three of this act, in exterminating the same. In case the owner or occupant of the premises shall refuse or neglect to comply with the orders of said inspector within five days, the inspector shall employ such aid as may be necessary to carry out his orders and recommendations, the expense of which procedure shall be certified to the township board and by them allowed, who shall cause the same to be assessed as a special tax upon the premises concerned.

SEC. 10. The State inspector of orchards and nurseries shall have power to appoint such number of deputy inspectors as may be required, subject to approval by the State Board of Agriculture.

SEC. 11. All expenses incurred under the provisions of this act, not otherwise provided for, shall be audited by the State Board of Agriculture, and paid out of the general fund of the State, and the Auditor General shall draw his warrant for the same: *Provided*, That all moneys collected by the State Board of Agriculture, under this act, shall be paid into the general fund of the State Treasury.

PILFERING FROM ORCHARDS.

AN ACT to protect vineyards, orchards, and gardens, and to repeal act number 131, public acts of 1869, entitled "An act to protect vineyards in the State of Michigan," being section 9195 of Howell's annotated statutes.

SECTION 1. *The People of the State of Michigan enact*, That any person who shall enter a vineyard, orchard, or garden, during the months of July, August, September, or October, without the consent of the owner, and pick, take, carry away, destroy, or injure any of the fruits, vegetables, or crops therein, or in anywise injure or destroy any bush, tree, vine, or plant, shall be guilty of a misdemeanor.

and on conviction thereof shall be punished by imprisonment in county jail, not more than ninety days, or by fine not less than five nor more than one hundred dollars, or by both such fine and imprisonment in the discretion of the court.

SEC. 2. That act number 131 of the public acts of 1869, entitled "An act to protect vineyards in the State of Michigan," being section 9195 of Howell's annotated statutes of Michigan, be and the same is hereby repealed.

MARKING FRUIT PACKAGES.

AN ACT to provide for marking on packages, designed for the shipment of certain specified kinds of fruit, the number of pounds which each of said packages shall contain.

SECTION 1. *The People of the State of Michigan enact,* That all manufacturers of peach baskets and other fruit packages designed for the shipment of peaches, grapes, and plums, and all shippers and dealers in the same, shall mark or cause to be marked, in a plain manner, on the outside, otherwise than the bottom, of such baskets or packages, the capacity of each basket or package, in pounds, at the rate of one pound for each 43.008 cubic inches of space contained in such basket or package.

SEC. 2. Any manufacturer of or dealer in peach baskets or other fruit packages designed for the shipment of peaches, grapes, and plums, who shall sell or offer to sell such baskets or packages without complying with the provisions of this act, shall be deemed guilty of misdemeanor, and upon conviction thereof in any court of competent jurisdiction, shall be fined not less than twenty-five dollars nor more than one hundred dollars, and stand committed to the county jail until such fine and costs are paid.

SEC. 3. All acts or parts of acts contravening the provisions of this act are hereby repealed.

HORTICULTURAL SOCIETIES.

ANNUAL MEMBERS OF THE

MICHIGAN STATE HORTICULTURAL SOCIETY

FOR 1897.

Edwy C. Reid	Allegan	A. Hamilton	Bangor
John Keating	Muskegon	George S. Meech	Grand Rapids
R. Morrill	Benton Harbor	C. A. Bloomer	Lisbon
S. B. Smith	Grand Rapids	E. P. Wilder	Grand Rapids
I. H. Butterfield	Agricultural College	L. J. Wheeler	Plainwell
R. H. Sherwood	Watervliet	Thompson and Lake	Grand Rapids
George Shackleton	Grand Rapids	H. O. Braman	" "
M. B. Williams	Douglas	S. J. Knapp	" "
E. A. Moseley	Grand Rapids	G. L. Dickerson	Palo
O. L. Brown	Bellevue	W. K. Munson	Grand Rapids
J. G. Hancock	Grand Haven	Perry Weed	Douglas
I. J. Bear	West Carlisle	U. S. Smith	Allegan
C. F. Hale	Shelby	E. C. Phillips	Grand Rapids
D. W. Wiley	Douglas	A. W. Mason	Palo
F. O. Rouse	Shelby	E. L. Bennett	Lowell
H. D. Plumbe	Mill Creek	Henry Smith	Grand Rapids
R. M. Kellogg	Three Rivers	Edward Hawley	Fennville
Robert Vahue	Allegan	B. M. O'Brien	Grand Rapids
L. B. Rice	Port Huron	H. D. Perkins	" "
H. H. Hayes	Talmadge	F. J. Russell	Hart
A. P. Green	Eaton Rapids	Elmer F. Lewis	Grand Rapids
W. S. Gebhart	Hart	Thomas Beal	Brooklyn
R. B. Strouts	Millburg	M. W. Willard	Kinsey
L. R. Taft	Agricultural College	W. A. Taylor	Washington, D. C.
R. D. Graham	Grand Rapids	W. W. Collier	Detroit
J. W. Bedford	Cushing	W. L. Farnum	Flint
W. S. Moffit	Rockford	A. I. Loop	Northeast, Pa.
G. G. Armitage	Three Rivers	A. W. Furness	Furnessville, Ind.
Thomas Gunson	Agricultural College	John Garmory	Rockford, Ill.
L. J. Post	Lowell	D. R. Waters	Spring Lake
J. F. Whitmeyer	Ionia	Martin Walsh	" "
C. B. Welch	Douglas	Frank M. Deremo	" "
C. W. Shriver	Benton Harbor	Mrs. A. C. Douglas	Houghton
W. H. Miller	Berrien Springs	Alvin E. Hathaway	Orangeville
J. A. Pearce	Grand Rapids	Henry Oldfield	Port Sanilac

ANN ARBOR HORTICULTURAL SOCIETY.

<i>President</i> —W. F. Bird.....	Ann Arbor
<i>Vice-President</i> —J. J. Parshall.....	" "
<i>Treasurer</i> —John Allmand.....	" "

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